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SEVENTH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[*From our own Correspondents.*]

Section A.—MATHEMATICAL AND PHYSICAL SCIENCE.

TUESDAY, SEPT. 11.

Dr. Robinson, of Armagh, read a Report of the Determination of the Constant of Lunar Nutation from a discussion of the Greenwich Observations.

The author commenced by giving a sketch of the commencement of accurate astronomy, under the auspices of Bradley, by his brilliant discoveries of the aberration of light and the nutation of the earth's axis, demonstrating, that a degree of precision until then deemed unattainable in astronomical observations, was perfectly possible. The impulse then given has not since ceased to effect the movements of astronomical discovery. Yet from his day, it must be acknowledged, that, in regard to both aberration and nutation, nothing was added to the researches of Bradley, until within a few years, when Struve, Brinkley, and Richardson resumed the inquiry. He then sketched the progress of each of these, and stated, that the constant of nutation deduced by Brinkley was that generally adopted by British astronomers. In Germany, however, the authority of Bessel had introduced and given currency to a different value for this important element of calculation, deduced from the calculations of Von Lindenau; and although the two values differ only one-fourth of a second, which is less than the millionth part of the length of the telescopes generally used in observing, yet such is the accuracy required in the modern researches of astronomy, that even this evanescent quantity of error is considered as a disgrace. This stigma, he trusted, was now removed by the work which the aid of the British Association had enabled him to perform, and of which he now intended to give a brief notice.

Dr. Robinson then referred to the labour of reducing observations, as actually taken, in consequence of the refraction of light, the aberration of the stars caused by the progressive propagation of light, the proper motions of the stars, and the united effect of all the movements impressed with the earth upon the actual place of the observer. Of these, the impressions upon the axis of the earth are pre-eminent, and the largest of them in amount has been long known under the name of the Precession of the Equinoxes—this is well known both as to its laws and amount; the remaining three are termed Nutations, of which one completes its course in a fortnight, and is never so large as one-tenth of a second—the theory of this is sufficiently known; a second completes its cycle in half a year, and when greatest may amount to half a second, and has been separately determined by the admirable observations of Dr. Brinkley; the third is the largest in amount, being about 9″, and completing its cycle in the time of a complete revolution of the moon's nodes, or about eighteen years, rather more: the exact determination of this was the object of the discussion of the observations of which he was now giving an account. He then proceeded to give a general description of the method of employing the observations, and the kind of observations to be selected for this determination, showing that it was most important to have a complete series of observations extending through the entire period of the moon's nodes, made with the same instruments, and if possible, by the same observer, or at least with the same system of observation. The observations made at Greenwich under the superintendence of the late Mr. Pond were those selected. The tables of Bessel were used; his values of declination, nutation, and proper motion were used, but Dr. Robinson had used his own values of aberration and refraction. Upwards of 4000 observations of the pole-star above were used, and in the results more than 2000 above and below were combined to give the zero of polar distance; the others were used to watch for and detect any change in the instrument. He then stated the principle on which the other stars were selected, to be, that their altitudes secured them from uncertainties in refraction, and that they should be such, that at least two-thirds of the nutation should exist in the direction of their polar distances; of such stars fifteen were in the Greenwich Observation, but some of these could not be used. They afforded about 8000 results, but 6000 only were used; an accident which occurred to the instrument in 1820 rendered useless about 1000 of these. The mean results of these observations being taken with the precautions which the paper pointed out at length, the results of some required that the value of Lindenau, which is 8″.977 should be increased, while others required that it should be diminished; on the whole an increase of 0″.257 was acquired, giving the result 9″.234, which differed only by sixteen thousandths of a second from the number selected by Mr. Baily, and used in his invaluable Catalogue. The learned author then proceeded to notice and remove certain objections which, he anticipated, might be made to the details of his method of reduction; in the course of these he stated, that as the corrections of Bessel's proper motions which his work has given, are all, except in one instance, negative, he inferred that the Greenwich circle was undergoing some progressive change of figure, making it show polar distances too great for about 30° south of zenith. If this were so, he observed, the sagacity of Mr. Airy would not permit it to be long undetected. He then read a table from these observations, showing that the declinations as obtained from his calculations, though they differed materially from those given by Pond himself in the Nautical Almanac for 1834, yet agreed closely with those of Bessel, thus showing, that the difference between these Catalogues arises solely from the different methods of reduction, and exciting the wish, that the British Association might lend its aid in reducing the whole of the Greenwich observations made by Pond.

Mr. Baily congratulated Dr. Robinson on the successful termination of his labours. He stated, that it was a curious fact, that Busch, of Berlin, had, from a series of observations made by Bradley at Wanstead, before he removed to Greenwich, computed the nutation, and given its value 9″.2347, thus differing by only 7 ten-thousandths of a second from the value deduced by Dr. Robinson, although the cycle of observations was different, the instruments and places of observations and the observers were all different: this was a coincidence scarcely to be equalled in the annals of science.—Sir William Hamilton asked some questions regarding the manner in which the observations of the pole-star were used by Dr. Robinson, as contrasted with the method adopted by Lindenau, and seemed satisfied with the answers which were given. He stated, that he felt great gratification at what he might almost call the complete solution of this important problem, and expressed his concurrence in the conclusion to which Dr. Robinson had come in consequence of the discrepancies between the calculated declinations, and those given in the Nautical Almanac.

Mr. Russell then presented the Report of the Committee on Waves.—Mr. Robison and Mr. Russell, of Edinburgh, had been appointed at the Bristol Meeting of the British Association a Committee to prosecute an inquiry concerning the Mechanism of Waves, in which Mr. Russell had been previously engaged, and to extend their observations to the determination of the effect of the form of channel and of the wind upon the tidal wave. Mr. Lubbock and Mr. Whewell had already determined, by their investigations, the laws of the propagation of the oceanic tide, but it still remained to assign the law of propagation of the tide in those shallow seas and rivers, where the bottom and sides of the channel exercise the principal influence on the propagation of the tidal wave. For the purpose of determining the effect of these circumstances upon the form, magnitude, and velocity of the tide wave, Mr. Russell had made in September, 1836, a series of observations on the River Dee, below Chester, where that river has a form and dimensions admirably suited to the purpose. It appears, that for more than five miles in length, the banks of the Dee are perfectly straight, quite parallel to one another, while the depth of the channel at low water is nearly uniform throughout the whole of that length. Now, in this river there is a tidal wave of from six to fifteen feet, forming, in fact, a tidal canal of large dimensions. On this part of the river the first series of observations were made. A second series of observations was made upon the River Clyde in April and May, 1837, under peculiar advantages. On the application of Sir Thomas Brisbane, a former President of the Association, the Trustees of the River Clyde offered to Mr. Russell all the assistance at their disposal, and every facility for making observations, which they conceived to be equally useful to practical navigation as to the advancement of abstract science; and their engineer, Mr. Logan, had contributed much to the success of these observations. Accurate trigonometrical surveys of the channel of the river, with correct levels and transverse sections, were obtained, and a series of simultaneous observations made at nine different stations on the river. A series of observations had also been made on the waves at the surface of the sea, and the series had terminated by a course of experiments made in artificial channels of different forms, for the purpose of determining the nature of the mechanism of the generation and propagation of waves, so as to determine the identity of their nature with the tidal wave.

Of this series of experiments and observations, the following are some of the results:—

It appears that there exists a species of wave different from all the others, and which Mr. Russell calls "The Great Primary Wave of Translation," which is generated whenever an addition is made to the volume of a quiescent fluid, in such a manner as to affect simultaneously the whole depth of the fluid, and this species of wave is exactly of the same nature as the tide wave. In a rectangular channel this primary wave moves with the velocity which a heavy body would acquire in falling through half the depth of the fluid, so that

In a channel about 4 inches deep, the velocity of the wave is nearly 2 miles an hour.

—	12	—	—	4	—
—	2 feet deep		—	5½	—
—	3	—	—	6¾	—
—	4	—	—	7¾	—
—	5	—	—	8⅝	—
—	6	—	—	9½	—
—	7	—	—	10 1-5th	—
—	8	—	—	11	—
—	9	—	—	11½	—
—	10	—	—	12 1-5th	—
—	15	—	—	15	—
—	30	—	—	20	—
	&c.			&c.	

It also appears that the breadth of the channel, when the depth is given, does not at all affect the velocity or form of the wave; and Mr. Russell then proceeded to assign a general rule, by means of which the velocity of the wave might be assigned *à priori* for a channel of any form, however irregular.

The manner in which the wave was observed, was by successive reflections from opposite surfaces, so as to make it pass and re-pass a given station of observation, the interval being noted by an accurate chronometer; and it was stated, that in many cases, above sixty transits of the same wave had been observed, so as to give a high degree of accuracy to the observations. The instant of the wave's transit had been observed by the reflection of a luminous image, thrown down by a series of mirrors, so as to cross micrometer

wires with perfect precision. For a mode of determining the length of the wave, Mr. Russell acknowledged himself indebted to Professor Stevelly, of Belfast.

These observations, having determined the laws of the propagation of waves on a small experimental scale, were then extended to the analogous phænomena of the great tidal wave. In his observations on the River Dee, Mr. Russell found that the tide wave followed precisely the same laws as those in his experimental channel; that its velocity was exactly proportioned to the square root of the depth of the fluid, that its form changed in the same manner, and the existence of the same law was sufficient to account for the different rate of propagation of different tides between two given places, because a tide of fifteen feet deep would travel from one place to another at the rate of fifteen miles an hour, while one of ten feet deep would only proceed at the rate of twelve miles an hour; so that if the places were thirty miles apart, the one would receive the former tide two hours later, and the latter tide two and a half hours later than the other. The creation of a tidal Bore in some places was also accounted for on the same principles; and it was evident, that the means of improving the navigation of tidal rivers might be satisfactorily deduced from these principles

Similar observations had been made on the tidal wave of the River Clyde, which was found to move in strict conformity with the laws of the great wave of translation, as determined by Mr. Russell's previous experiments.

The effect of the wind upon the tidal wave had been eliminated by Mr. Lubbock from the Liverpool observations, and had been denied by Monsieur Daussy, in his discussion of the Brest observations. Mr. Robison and Mr. Russell had directed their observations to this also, and had ascertained, that its effects were of the most decided character. It was however probable, that during the ensuing year they would be able to determine the nature and the measure of these effects with still greater precision.

Mr. Whewell asked several questions of Mr. Russell respecting the method adopted for taking the level of the rivers in the Dee and in the Clyde.—Mr. Russell replied, that the level of mean tide was used in the Dee, and a fixed line was taken for many miles along the Clyde.—Mr. Whewell also asked how the depths were taken, and how the agitation arising from the pressure of the waves was determined at various depths.—Mr. Russell replied, that the depths were taken by actual measurement, but that the pressures at various depths had only been taken on the small scale of the models.—Mr. Whewell expressed much gratification at the methods of experimenting adopted by Mr. Russell; and although some of his conclusions seemed at present to be scarcely reconcileable with the theoretic views held on the subject, yet he anticipated that the utmost advantage would result from researches so ably conducted, and trusted that Mr. Russell would continue and extend them.—Sir William Hamilton fully concurred in the expressions of approbation which had fallen from Mr. Whewell.

Mr. Blackburne made a communication respecting certain Geometrical Theorems. He gave some examples of geometric series, which, when multiplied together, were capable of being reduced to other series of very simple forms, and the values of those series, or their sums, could be readily obtained, and in one or two instances he showed the method of obtaining them. He laid upon the table of the Section several manuscript books, containing various curious and interesting theorems, but the nature of them is such as could not possibly interest the general reader.

Prof. Powell then read a paper 'On Von Wrede's Explanation of the Absorption of Light by the Undulatory Theory.'

Von Wrede supposes the particles of a transparent body placed regularly at equal distances (b), and the ether being diffused between them, a ray of light is propagated directly through the medium, but a portion of each wave encounters some of the particles, and is reflected backwards; then forwards again; and emerges along with the direct ray; and from the retardation it has undergone, it may interfere so as to produce darkness, if the retardation amount to an odd multiple of the half-wave length (λ), but brightness if an even multiple of that quantity. These effects may be confounded together in white light, and by prismatic analysis they will be seen as dark bands.

The author investigated a formula for the intensity of the light so resulting. It was deduced from the ordinary view of undulations, and brought into a form including certain constant terms, together with the factor cos. $2\,\pi\,\frac{2b}{\lambda}$, which is so involved, that the intensity is a maximum when the cosine is $=+1$ or when $2\,\pi\,\frac{2b}{\lambda}$ is an even multiple of a semicircumference; and a minimum when the cosine $=-1$, or when the arc is an odd multiple of a semicircumference. Hence, if the medium be such that $2b=\frac{\lambda}{2}$ for any ray, that ray will be deficient. If $2b$ be less than the value of $\frac{\lambda}{2}$ for the violet ray, which is its least value, there will be no absorption: if greater, some ray will be at a minimum. Let us suppose $2b=n\lambda$, then passing from one end of the spectrum to the other, there will be changes of intensity dependent on the changes of the cosine between the limits cos. $2\,\pi\,n$ and cos. $2\,\pi\,n\,\frac{\lambda r}{\lambda v}$; maxima when cos. $=+1$, and minima when -1: the number depending on (n), that is, on (b), which may be supposed as large as we please.

This investigation applying to a simple medium, the author showed that the expression for a compound of several media, with different values of (b), will still preserve the condition of depending on the changes of the cosine, and each medium will retain its own set of maxima and minima, which will be superposed in the spectrum.

Thus far the successive reflections had been considered as taking place only between two sets of particles or reflecting surfaces: the case was then investigated where several such were taken into account, and a formula resulted which was more complex, but whose maxima and minima depended on exactly the same conditions.

The author showed that the more regular phænomena of absorption are completely explained by this hypothesis, and, in one instance, even proceeded with success to a numerical comparison. He pointed out also an experimental imitation of the supposed process, which was perfectly successful.

Sir David Brewster conceived, that the theory of Von Wrede was entirely inadmissible. He stated many cases of absorption, where there was not an appearance of reflection, as in the case of nitrous gas, which by mere changes of temperature became as black and as impenetrable to light as charcoal. Sir John Herschel had also noticed many cases of absorption without any trace of reflection; and only in the cases of some vegetable colours did he ever experience the contrary.—Professor Lloyd asked whether the changes might not result from partial changes of density caused in the substances by changes of temperature?—Sir David Brewster stated, that it was impossible there could be any change of density in the case of the nitrous gas, as the changes in its temperature took place while its volume was secured from enlargement by its being sealed up in glass tubes. At one time he was inclined to think, that some chemical change might have been effected upon the glass, but the phænomena did not long warrant this conclusion. The phænomena of absorption could be all had from plates of partially decomposed glass, such as that which had been long buried in the earth, but this was a case of real opalescence.—Sir W. Hamilton conceived, that the views of Wrede required the confirmation of more exact numerical examination, before they could be adopted; and he trusted, that Sir David Brewster would give the inquiry the advantage of his great skill and experience.

Sir W. Hamilton then gave an account of His Exposition of the argument of Abel, respecting equations of the fifth degree. Sir William stated, that the celebrated young Swedish Philosopher, Abel, whose labours (unfortunately for the cause of science) had lately terminated with his life, had at one time supposed that he had found a method of solving generally equations of the fifth degree, but soon finding that this solution was illusory, it occurred to him that perhaps, under the conditions of ordinary algebra, such a solution was an impossibility; as soon as he had started this thought, he pursued it through a most intricate argument, and at length achieved what any one upon first hearing it would be apt to consider most chimerical—an *à priori* argument to prove, that the solution of an equation of the fifth degree was, under the limitations of ordinary algebra, an impossibility.

The argument of Abel consisted of two principal parts; one independent of the degree of the equation, and the other dependent on that degree. The general principle was first laid down, by him, that whatever may be the degree n of any general algebraic equation, if it be possible to express a root of that equation, in terms of the coefficients, by any finite combination of rational functions, and of radicals with prime exponents, then every radical in such an expression, when reduced to its most simple form, must be equal to a rational (though not a symmetric) function of the n roots of the original equation; and must, when considered as such a function, have exactly as many values, arising from the permutation of those n roots among themselves, as it has values when considered as a radical, arising from the introduction of factors which are roots of unity. And in proceeding to apply this general principle to equations of the fifth degree, the same illustrious mathematician employed certain properties of functions of five variables, which may be condensed into the two following theorems: that, if a rational function of five independent variables have a prime power symmetric, without being symmetric itself, it must be the square root of the product of the ten squares of differences of the five variables, or at least that square root multiplied by some symmetric function; and that, if a rational function of the same variables have, itself, more than two values, its square, its cube, and its fifth power have, each, more than two values also. Sir William Hamilton conceived that the reflections into which he had been led, were adapted to remove some obscurities and doubts which might remain upon the mind of a reader of Abel's argument; he hoped also that he had thrown light upon this argument in a new way, by employing its premises to deduce, *à priori*, the known solutions of quadratic, cubic, and biquadratic equations, and to show that no new solutions of such equations, with radicals essentially different from those at present used, remain to be discovered: but whether or not he had himself been useful in this way, he considered Abel's result as established: namely, that it is impossible to express a root of the general equation of the fifth degree, in terms of the coefficients of that equation, by any finite combination of radicals and rational functions.

What appeared to him the fallacy in Mr. Jerrard's very ingenious attempt to accomplish this impossible object, had been already laid before the British Association at Bristol, and was to appear in the forthcoming volume of the Reports of that Association. Meanwhile, Sir William Hamilton was anxious to state his full conviction, founded both on theoretical reasoning and on actual experiment, that Mr. Jerrard's method was adequate to achieve an almost equally curious and unexpected transformation, namely, the reduction of the general equation of the fifth degree, with five coefficients, real or imaginary, to a trinomial form; and therefore ultimately to that very simple state, in which the sum of an unknown number (real or imaginary) and of its own fifth power, is equalled to a known (real or imaginary) number. In this manner, the general dependence of the modulus and amplitude of a root of the *general* equation of the fifth degree, on the five moduli and five amplitudes of the five coefficients of that equation, is reduced to the dependence of the modulus and amplitude of a new (real or imaginary) number on the one modulus and one amplitude of the sum of that number and its own fifth power; a reduction which Sir William Hamilton regards as very remarkable in theory, and as not unimportant in practice, since it reduces the solution of any proposed numerical equation of the fifth degree, even with imaginary coefficients, to the employment, without tentation, of the known logarithmic tables, and of two new tables of double entry, which he has had the curiosity to construct and to apply.

It appears possible enough, that this transformation, deduced from Mr. Jerrard's principles, conducts to the simplest of all forms under which the general equation of the fifth degree can be put; yet, Sir William Hamilton thinks that algebraists ought not absolutely to despair of discovering some new transformation, which shall conduct to a method of solution more analogous to the known ways of resolving equations of lower degrees, though not, like them, dependent entirely upon radicals. He inquired in what sense it is true, that the general equation of the fifth degree would be resolved, if, contrary to the theory of Abel, it were possible to discover, as Mr. Jerrard and others have sought to do, a reduction of that general equation to the binomial form, or to the extraction of a fifth root of an expression in general imaginary? And he conceived that the propriety of considering such extraction as an admitted instrument of calculation in elementary algebra, is ultimately founded on this: that the two real equations,

$$x^5-10x^3y^2+5xy^4=a,$$
$$5x^4y-10x^2y^3+y^5=b,$$

into which the imaginary equation

$$(x+\sqrt{-1}\,y)^5=a+\sqrt{-1}\,b$$

resolves itself, may be transformed into two others which are of the forms

$$\rho^5=r, \text{ and } \frac{5\tau-10\tau^3+\tau^5}{1-10\tau^2+5\tau^4}=t,$$

so that each of these two new equations expresses one given real number as a known rational function of one sought real number. But, notwithstanding the interest which attaches to these two particular forms of rational functions, and generally to the analogous forms which present themselves in separating the real and imaginary parts of a radical of the n^{th} degree, Sir William Hamilton does not conceive that they both possess so eminent a prerogative of simplicity as to entitle the inverses of them alone to be admitted among the instruments of elementary algebra, to the exclusion of the inverses of all other real and rational functions of single real variables. And he thinks, that since Mr. Jerrard has succeeded in reducing the general equation of the fifth degree, with five imaginary coefficients, to the trinomial form above described, which resolves itself into the two real equations following,

$$x^5-10x^3y^2+5xy^4+x=a,$$
$$5x^4y-10x^2y^3+y^5+y=b,$$

it ought now to be the object of those who interest themselves in the improvement of this part of algebra, to inquire, whether the dependence of the two real numbers x and y, in these two last equations, on the two real numbers a and b, cannot be expressed by the help of the real inverses of some new real and rational or even transcendental functions of single real variables; or (to express the same thing in a practical or in a geometrical form) to inquire whether the two sought real numbers cannot be calculated by a finite number of tables of single entry, or constructed by the help of a finite number of curves: although the argument of Abel excludes all hope that this can be accomplished, if we confine ourselves to those particular forms of rational functions which are connected with the extraction of radicals.

Mr. Peacock observed that the Section were scarcely aware of, and could not be too strongly impressed with the value of an attempt like that of Sir W. Hamilton to render this celebrated argument of Abel intelligible to beginners, and even to advanced students in algebra. The constitution of most minds was such that they were anxious to run away from those subjects on which their labours could be profitably employed, and to engage themselves in the prosecution of curious and sometimes almost useless difficulties. He exemplified the celebrated resolution of the Academy of Sciences of Berlin, that they would in future receive no more communications on the subject of squaring the circle, as a remarkable proof of the extent of this morbid state of mind, for it was a fact that the average number of communications on this subject, when taken for many years, amounted to four annually. The rage for resolving mere algebraic difficulties was pretty much the same, and he, therefore, for one, felt that the gratitude of men of science was due to Sir W. Hamilton for thus giving an *à priori* argument, the obvious tendency of which was to save the laborious exertion of talent in fruitless research, a labour for the employment of which such vast regions were at present opening before us in rich profusion. As it occurred to him, the chief advantage which he expected from the method adopted by Sir W. Hamilton was this: that whereas from its very intricacy the argument of Abel would be inaccessible to the ordinary algebraist, and a doubt therefore would always remain on his mind of the validity of the conclusion, and consequently he would be tempted even still more strongly to essay the difficulty for himself,—the method of Sir W. Hamilton, besides making the principle and many of the steps of the argument intelligible to all, and therefore giving a high degree of probability to the conclusion, has this peculiar advantage, that by applying the very same mode of arguing to quadratic, cubic, and biquadratic equations, it has not only proved that they are soluble by precisely the modes by which we at present resolve them, but it proves further, that they are insoluble by any other purely algebraic device. This seems to be conclusive, and must carry conviction to every mind.

Mr. Henwood made a communication 'On the relative Temperature of Slate and Granite.' Mr. Henwood stated that having had access to various mines in Cornwall, varying from 20 to 240 fathoms in depth, he had made numerous experiments on the temperatures of the several rocks by means of the streams of water issuing from them; he would not delay the Section by detailing at length the experiments, which amounted to several hundred, but at once state the result, which was, that in every case he found the granite to be 13.°9 colder than the slate at the same depth; but the rate at which the temperature of the slate diminished in descending was considerably slower than the rate at which the temperature of the granite diminished, the one being 1 degree in 69 fathoms, the other 1 degree in 65 fathoms.

Prof. Stevelly observed, that these results were interesting in two points of view; first, inasmuch as Professor Forbes, in his rambles in several parts of the Pyrenees, had found granite which was absolutely hot, and from which thermal springs were issuing, facts not a little puzzling to the geologists; while the researches of Mr. Henwood proved that the high temperature of granite, when compared with other rocks, was not a fact of universal occurrence. The second point of view in which he thought Mr. Henwood's communication interesting was, that as the rate of cooling of the granite as you descended was greater than that of the slate, there must necessarily be some point within the earth at which their temperature would become equal, thus rendering still more probable a common source of high temperature to both within the earth.—Soon after Mr. Henwood had left the Section, a gentleman from Penzance, whose name has escaped us, came into the Section-room and stated that he had hoped to arrive before the conclusion of Mr. Henwood's communication, as he had facts to detail from the mines in Cornwall which would lead to precisely opposite results to those deduced by Mr. Henwood; but as that gentleman had left the Section, he would not occupy time with any further remarks.

Sir W. Hamilton now made an exposition of Mr. Turner's theorem respecting the series of odd numbers and the cubes and other powers of the natural numbers.—Sir William stated that if you take the series of odd numbers and divide them into groups, as below, of one, two, three, &c. terms, consecutively, the sums of these groups furnish the cubes of the natural numbers, as follows,

1	3 5	7 9 11	13 15 17 19
Sum $=1$	Sum $=8=2^3$	Sum $=27=3^3$	Sum $=64=4^3$

And a theorem of a general kind could thus be stated: any power, n^m of any number $n =$ sum of n consecutive odd numbers, the extremes being the sum and the difference of the next less power n^{m-1}, and the next less number $n-1$. For example, the 5th power of 3 is the sum of the three consecutive odd numbers of which the extremes are the next less power, namely, the fourth power of 3 or 81, and the next less number or 2, these extreme odd numbers being 79 and 83; the sum of all is $79+81+83=243=3^5$. A formula for this little theorem is easily obtained, and a general proof is capable of being applied; but it seems not to have been publicly known; Mr. Turner put him in possession of it yesterday. It struck him as possessing much merit.

Mr. Peacock asked whether theorems involving those properties were not to be found in Euler's works; for his part, he scarcely ever met with any curious or valuable properties of numbers, which, upon reference, he did not find in that great magazine of knowledge upon these subjects.—Professor Stevelly stated that there was another curious property of the natural numbers, and their cubes, which he was not aware was generally known: it was this, that if you take a set of weights denominated by any number of the natural series of numbers and of their cubes, you can with these weights, by occasionally using some in one scale and some in the other, weigh up to the weight expressed by the sum of all used, thus,

1	2	3	4	5	&c.	natural numbers.
1	8	27	64	125	&c.	cubes.

Taking the weights denominated by 1, 2, 3; 1, 8, and 27, and you can with these six weigh any weight up to the sum of all, which is 42; perhaps this was also in the depository of hoarded stores mentioned by the President, but he had not seen it in any work which was much known.

WEDNESDAY.

The President, on taking the chair, informed the Section, that one of the secretaries, the Rev. Mr. Powell, having been unexpectedly called away to London, the Committee had requested Professor Lloyd to undertake the duties of that office in his room. He then called on Professor Lloyd for an 'Account of the Magnetical Observatory,' now in course of erection at Dublin.

In bringing this subject under the notice of the Section in its present stage, Mr. Lloyd said, that he trusted little apology was required. The establishment of permanent magnetical stations has been urged by the powerful recommendation of the British Association; and he was sure that that body would view with interest the progress of an undertaking, the importance of which was sanctioned by its authority.

The magnetical observatory now in progress at Dublin, is situated in an open space in the gardens of Trinity College, and sufficiently remote from all disturbing influences. The building is forty feet in length, by thirty in depth. It is constructed of the dark-coloured argillaceous limestone, which abounds in the valley of Dublin, and which has been ascertained to be perfectly devoid of any influence on the needle. This is faced with Portland stone; and within, the walls are to be *studded*, to protect from cold and damp. No iron whatever will be used throughout the building. With reference to the materials, Professor Lloyd mentioned, that in the course of the arrangements now making for the erection of a Magnetical Observatory at Greenwich, Mr. Airy had rejected bricks in the construction of the building, finding that they were in all cases magnetic, and sometimes even polar. Mr. Lloyd has since confirmed this observation, by the examination of specimens of bricks from various localities; and though there appeared to be great diversity in the amount of their action on the needle, he met with none entirely free from such influence.

The building consists of one principal room, and two smaller rooms,—one of which serves as a vestibule. The principal room is thirty-six feet in length, by sixteen in breadth, and has projections in its longer sides, which increase the breadth of the central part to twenty feet. This room will contain four principal instruments, suitably supported on stone pillars: viz. a transit instrument, a theodolite, a variation instrument, and a dipping circle. The transit instrument (four feet in focal length,) will be stationed close to the southern window of the room. In this position it will serve for the determination of the time; and a small trap-door in the ceiling will enable the observer to adjust it to the meridian. The theodolite will be situated towards the other end of the room, and its centre will be on the meridian line of the transit. The limb of the theodolite is twelve inches in diameter, and is read off by three verniers to ten seconds. Its telescope has a focal length of twenty inches, and is furnished with a micrometer reading to a single second, for the purpose of observing the *diurnal variation*.

The variation instrument will be placed in the magnetic meridian, with respect to the theodolite, the distance between these instruments being about seven feet. The needle is a rectangular bar, twelve inches long, suspended by parallel silk fibres, and inclosed in a box to protect it from the agitation of

the air. The magnetic bar is furnished with an achromatic lens at one end, and a cross of wires at the other, after the principle of the collimator. This will be observed with the telescope of the theodolite, in the usual manner; and the deviation of the line of collimation of the collimator from the magnetic axis will be ascertained by reversal. The direction of the *magnetic* meridian being thus found, that of the true meridian will be given by the transit. It is only necessary to turn over the transit telescope, and, using it also as a collimator, to make a similar reading of its central wire, by the telescope of the theodolite. The angle read off on the limb of the theodolite is obviously the supplement of the variation. This use of the transit has been suggested by Dr. Robinson; and it is anticipated that much advantage will result from the circumstance, that the two extremities of the arc are observed by precisely the same instrumental means. With this apparatus it is intended to make observations of the *absolute variation* twice each day, as is done in the observatory of Professor Gauss, at Göttingen,—the course of the *diurnal variation*, and the hours of maxima and minima, having been ascertained by a series of preliminary observations with the same instrument.

A dipping circle constructed by Gambey, will be placed on a pillar at the remote end of the room; and will be furnished with a needle, whose axis is formed into a knife-edge, for the purpose of observing the diurnal variations of the dip. Gauss's large apparatus will also be set up in the same room, and will be used occasionally, especially in observations of the *absolute intensity*, made according to the method proposed by that distinguished philosopher. The bars are too large to be employed in conjunction with other magnetical apparatus.

It is intended to combine a regular series of meteorological observations, with those on the direction and intensity of the terrestrial magnetic force just spoken of; and every care and precaution has been adopted in the construction of the instruments.

In conclusion, Mr. Lloyd said, that he felt it a duty to allude to the liberality and zeal in the cause of science, which had been evinced by the Board of Trinity College on this occasion. The probable expense of the building and instruments is estimated at 1000*l.*; and that sum was immediately allocated to the purpose, when it appeared that the interests of science were likely to be benefited by the outlay.

Mr. Peacock congratulated the Section upon the prospect held out to the scientific world, of having fixed magnetical observatories erected in such places as would afford the surest promise of successful cooperation, particularly when they would be placed under the superintendence of gentlemen so eminently qualified for the task as Professor Lloyd. He informed the Section, that an observatory for magnetical observations had been erected at Greenwich, and that little doubt need be entertained of the rapid advances which the interesting investigations connected with this important science would now receive.—Mr. Ettrick conceived, that bricks would be a very improper material for the construction of a magnetical observatory. He considered the use of metals in any part of the building as highly objectionable; even copper as fastenings or hinges to doors, would not be free from injurious effect. He made some inquiries as to the mode of reading off, proposed by Professor Lloyd.—Prof. Stevelly said, that Mr. Ettrick was unquestionably right in the objection urged against the use of bricks, but Professor Lloyd had distinctly stated, that bricks were not to be used, and that experiments had been made to ascertain the precise magnetical influence, if any there was, of the kind of stone which it was proposed to use. It was well, however, that Mr. Ettrick's observations should go abroad, for the guidance of persons not conversant with these subjects. Bricks, when built into large edifices, such as the chimneys of factories, were well-known to have acquired magnetic polarity: the material from which they were made must be largely impregnated with iron: the mud of rivers was the detritus from hills, whose rocks were often highly magnetic. The engineers employed on the trigonometrical survey of Ireland, had erected a mound of stones composed of basalt, to sustain the signal-staff which they had erected on the highest hill, near Belfast; the effect of that heap of stones on the magnetic needle was so great, that in walking round it the needle would veer round to every point of the compass.

M. de la Rive then read a paper 'On the Interference of Electro-magnetic Currents.' This distinguished foreigner addressed the Section in the French language. After a brief *résumé* of the known properties of electro-magnetic currents, he adverted to some new results at which he had arrived in studying them. He remarked, that in chemical decomposition effected by these currents, the *individual* force of each was greater the more rapidly they succeeded each other; so that, to decompose a given quantity of water, it becomes necessary to have a number of these currents, so much the greater as the succession is less rapid. There is, however, a limit, beyond which the force of the currents is not augmented by any further augmentation of the rapidity of the succession. When plates of platina are employed, instead of wires, in the decomposition of water, the decomposition ceases to take place when the surface of contact of the metal with the liquid surpasses a certain limit. Nevertheless, the current, far from diminishing in intensity, becomes, on the contrary, more intense—as is shown by the indications of a metallic thermometer—the helix of which, placed in the current, furnishes a measure of its calorific energy. As soon as the surfaces of contact are of such magnitude that decomposition is no longer effected, the thermometer reaches a maximum, which it does not pass, even when the surfaces of contact are augmented. This fact seems to prove, that chemical decomposition produced by electrical currents takes place only when these currents undergo a certain resistance in their passage from the metal into the liquid; and that, when this resistance does not exist, decomposition ceases. When we employ wires of platina to transmit the magneto-electric currents into a solution of any kind, whether acid, saline, or alkaline, we, at first, observe an abundant evolution of gas; then this disengagement diminishes, and at the end of fifteen or twenty minutes it altogether disappears. When we examine these metallic wires, we find them covered with a very fine powder, composed of platina in the metallic state, but extremely divided. The same phænomenon takes place with gold, palladium, silver, &c. All these metals are covered, in the same manner, with a very fine coating of the metal itself in a state of extreme subdivision. The author has assured himself that this powder was composed of the metal itself, and not an oxide or a suboxide. He inquired whether this effect is the result of the mechanical shocks that the molecules of the metal undergo by the action of these currents, which are discontinuous, and alternately in opposite directions; and whether it would not be augmented by the succession of oxidations and deoxidations, which would occur on the surface of the wires. He concluded by stating, that he had observed that the armatures of soft iron, (about which the metallic wires are coiled, in which the currents are developed by induction,) cease to be attracted by the poles of the magnets, before which they pass when the two ends of the wire in which the current is developed are united by one good metallic conductor; a fact which would seem to prove that Magnetism, and Dynamical Electricity are, in these cases, but two different forms of the same force, one of which disappears when the other becomes apparent; and he insisted on the advantage that we might derive from this property in the production of motion by electro-magnets.

Professor Andrews, of Belfast, observed, that there was one portion of the detail, upon which he thought he could throw some light by mentioning a fact, with which he had lately become acquainted. If the poles of a galvanic arrangement of low tension, say a single pair of plates charged with weak acid, were made to communicate with two broad slips of platina immersed in water, no action whatever would take place; but if one of the broad slips was replaced by a fine wire, the pole which it represented would give off the appropriate gas, whether oxygen or hydrogen; but the broad slip at the other pole would give off none whatever—or whichever pole it might be connected with. Now the appearance of the gas at one pole was a clear proof, that water was decomposed; and therefore the gas which must be developed at the broad slip, must be dissolved in the liquid, or otherwise prevented from assuming the gaseous form. Persons not acquainted with this fact might infer, that there was no decomposing action exerted, when, in fact, as appeared plainly upon a more extended view of the phænomena, there was.—Mr. Lubbock inquired, from Professor Andrews, whether the hydrogen disappeared as well as the oxygen; for, although water can condense oxygen in considerable quantities, he was not aware that any considerable quantity of hydrogen could be so condensed.—Professor Andrews replied, that either would be given off at the fine platina wire, according to the pole you made it to represent, and neither would appear at the broad plate, showing that each would in turn be dissolved, or otherwise detained in the fluid.

M. de la Rive read a second paper 'On an Optical Phænomenon observed at Mont Blanc.' When the sun has set at Geneva, it is observed that Mont Blanc remains illuminated by its direct rays for a much longer time than the surrounding mountains. This phænomenon is owing to the great height of Mont Blanc. But, after it has ceased to be illuminated, the summit of Mont Blanc sometimes reappears at the end of ten or fifteen minutes, less intensely enlightened than at first, but nevertheless in a manner very decided, and often very brilliant. This phænomenon takes place especially when the atmosphere is very pure—highly charged with aqueous vapour in an invisible state—and consequently very transparent. The author has satisfied himself (by the exact observation of the time which elapses between the two successive illuminations of the mountain, combined with the calculation of the sun's progress) that the phænomenon is due to the rays of the sun which traverse the atmosphere at a distance from the earth less than the height of Mont Blanc, but greater than half that height, and which arrive at rarer regions of the atmosphere under an incidence so great that they are reflected instead of refracted. This interior reflection is facilitated by the humidity of that part of the atmosphere which the rays traverse until they reach the point of incidence. The reflected rays falling on the snowy summit of Mont Blanc, produce this second illumination; and the humidity (by augmenting the transparency of the air) renders the illumination more brilliant.

Sir D. Brewster stated that he had witnessed a similar effect, though on a less magnificent scale, on the Grampian Hills; but he had always observed that on such occasions the sun set in a red west, and that all the clouds in that quarter of the heavens were then red.—M. de la Rive replied that the phænomenon he spoke of only appeared when the sky was quite free from clouds, and, in truth, it was most brilliant when the air was very transparent in consequence of its being loaded with vapour in its elastic state.—Professor Lloyd said that the distinctness and vividness with which distant objects were seen in some states of the atmosphere was quite astonishing: on one occasion he had seen from the neighbourhood of Dublin the Welsh hills from their very bases, and brought so near apparently, that he could absolutely see the larger inequalities of the surface upon the sides of the mountains. That the atmosphere was at the time very much loaded with vapour in a highly transparent state, was obvious from the fact, that immediately after a very heavy fall of rain took place, and continued for a considerable time.—Professor Stevelly wished to confirm what had fallen from Professor Lloyd and M. de la Rive by stating that whenever the Scotch hills appeared with that peculiar vividness and distinctness, from the Lough of Belfast, the fishermen always looked upon it as a sure precursor of heavy rain and wind. A friend had informed him that on one occasion he had noticed this appearance while standing on the beach at Holly-wood, and pointed it out to an old fisherman; the old man immediately gave notice to all his friends to whom he had access, who instantly set about drawing up their boats and placing their small craft in more secure places; early the next morning a violent storm came on, which did much damage upon the coast, to those who had not been similarly forewarned. Thus we find that the most interesting pursuits of the man of science, and the most important concerns of man in the practical details of life, frequently approach, and each may lend important aid to the other.—Mr. Lubbock was of opinion that the principal fact mentioned by M. de la Rive would receive a simple

solution, if we admit the theory of Poisson regarding the constitution of the atmosphere. That eminent mathematician conceived that analysis led irresistibly to the conclusion that the upper portions of the atmosphere were, by the extreme cold there existing, condensed into a liquid or even into a solid: if this were so, we could easily conceive how the reflection of the light from its under surface would re-illuminate the top of Mont Blanc after the direct light of the sun had ceased to reach it.—Sir David Brewster expressed much surprise at hearing for the first time of this theory of Poisson, and that he should feel much obliged to Mr. Lubbock if he would give some details of it in a separate communication to the Section; and he had little doubt but that it would be as new and as acceptable to many gentlemen as to himself. He thought that the near apparent approach of distant objects in certain states of the air, as mentioned by Professor Lloyd and Professor Stevelly, might perhaps be accounted for by supposing that on these occasions the intervening air became actually converted into a large magnifying lens.

Major Sabine then made his 'Report upon the Variations in the Intensity of Terrestrial Magnetism at different parts of the surface of the Earth.'

This Report, he said, was to have been printed in the last year's volume of the Reports of the British Association. The occasion of the delay was the influx of new and very valuable materials, with which he had been furnished, when on the point of completing the Report. Amongst these, may be specified the observations made during a voyage of five years survey and circumnavigation by Capt. Fitz Roy and the officers of H.M. ship *Beagle*, by which determinations of the value of the terrestrial intensity had been obtained at between forty and fifty widely scattered stations, principally in the southern hemisphere, where such determinations had been previously a great desideratum. The reduction of these and other recent observations, was a work of much time and labour; but Major Sabine considered that the accession of these results has enhanced the value of the Report in a degree which more than counterbalances the inconvenience of the delay. The Report is now complete.

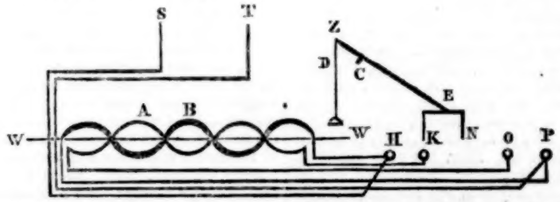
Major Sabine stated that his object, in this Report, had been to collect and present in a condensed and arranged form, the results of all the observations which have been made on this subject, by observers of all nations, from the commencement of such researches, about the close of the last century, to the present time. The works in which these observations were originally published, are chiefly the Transactions of scientific societies, or scientific journals, the greater part of which are in the German language, and not very easily to be met with in this country. The number of separate determinations collected in this Report exceeds six hundred, and the number of stations falls a little short of five hundred. They are the work of twenty-one observers, and of these the observations of seven have been hitherto unpublished. He then gave some short details of the arrangements of the tables of the Report, particularly as to the manner in which the values of the intensity are expressed; and the degree of agreement which is found in the results of different observers at the same station, from whence the degree of accuracy of each single determination may be inferred. The Report was accompanied by maps, in which the determinations were also entered, and the lines of equal magnetic intensity were drawn, for the purpose of enabling the eye more readily to apprehend the systematic distribution of the magnetic intensity on the earth's surface, which the facts now collected establish. Major Sabine discussed the general inferences in regard to the distribution of the intensity, which are pointed out by the concurrent and consistent testimony of so large a body of results; and concluded, by pointing out the parts of the earth where farther observations are most desirable,—adding such practical suggestions in regard to instruments and the methods of observation, as may be gathered from the experience of the observers whose observations he has discussed.

Major Sabine begged leave to add a curious fact, which he thought would interest the Section. One of the few observations, regarding the dip, which he had been induced to reject, in consequence of its differing by about five degrees from the dip which could be assigned to the geographical position, and which was very nearly the observed dip at the other side of the harbour, was the observed dip on a rock on which he landed, on the west side of the harbour of Loch Scavig, in the island of Sky. The observation at the other side of the harbour did not differ more than five minutes from the general deduction. Since he had come to this meeting, a friend had put into his hand a specimen of magnetic iron ore, taken from a large bed of that mineral found under the very spot on which he made the observations. These observations, and the fact which caused their rejection, were detailed in the last printed volume of the Reports of the Association; and the cause of this singular result had now been brought to light.

Sir David Brewster remarked, that a somewhat similar occurrence had taken place in the lawn of Sir Thomas Brisbane's demesne at Makerstoun, near Kelso, where some puzzling anomalies of the magnetic dip having been observed, they were, at length, found to arise from a quantity of slag from a smithy, which had been buried beneath the surface at the spot. These facts, and the conclusions which they warranted, might have an important practical application in the aiding of searches after iron ore.

The Rev. Mr. M'Gauley read a paper, 'On a convenient and efficient form of Electro-magnetic Apparatus for the production of Electricity of High Intensity,' and experimented with the machine before the Section. He remarked that, although he had not altered his opinions on the applicability of Electro-Magnetism as a moving power, he conceived we ought not to be satisfied with almost any portion of our present electro-magnetic apparatus; but that all that an individual could *unassisted* hope to achieve, would be to simplify and improve singly its various portions.

Any one, he observed, who had experimented on a large scale, must have found that the galvanic apparatus becomes considerable in size, and troublesome in operation; he had determined, therefore, to devote some time to the construction of a machine, from which we might obtain electricity of very high intensity, to be applied, if possible, to the magnetization of bars of soft iron. He was aware that a considerable effect was said to have been produced by a battery consisting merely of a wire of zinc, and another of platina, and a small quantity of acid; but as there is no standard for the measure of physiological effects but the variable susceptibility of individuals, he could not but think, from a variety of experiments he had made, that the shock was magnified by the surprise of the experimentalist, as we know it to have been at the discovery of the principle of the Leyden jar: of the power of the apparatus before it, the Section could judge for itself. Its construction was simple and permanent, and, from the ease with which it could be applied, and the power we possess of diminishing, at pleasure, the number and intensity of the shocks, it appeared well calculated for the purposes of medical electricity. It is self-acting; and as it requires no aid from the operator for the production of continued electrical effects, when once excited, it leaves his attention undivided for experiment. Besides the arrangement of its parts, which he believed to be the best of any he had tried, and which he would detail to the Section, he was inclined to attribute its efficiency to a number of circumstances he had not yet sufficient time to develope, and whose consideration, therefore, he would leave to another opportunity.



W W is a bar of soft iron 2 feet long, 3-4ths of an inch in diameter. A and B two helices, each about 580 feet long, No. 13 copper wire, one dextrorsum, the other sinistrorsum; the whirls of each are superimposed alternately on the other. H and P are mercury cups, connected with cylinders of copper S and T, for giving the shock, and with the extremities of helix B. K and O mercury cups connected with helix A. N, and the same cup O, connected with the poles of a small calorimeter; D a copper wire, carrying a soft iron knob to be attracted by the bar W W, and, when attracted, to draw down the lever Z E, turning on the centre C, and having fixed on its longer arm the curved wire E, which, being elevated or depressed, makes or breaks battery connexion with the extremities of helix B. The helices, bar, and wires, are enclosed, permanently, in a strong deal case, upon which are screwed the copper cylinders S and T, the fulcrum C upon which Z E moves, and the cups of mercury H, K, N, O, P. By sliding a small wedge under the extremity of the lever E, the knob D more nearly approaches the bar W W, and being more easily, is, therefore, with greater frequency attracted by it, as the time necessary for intense magnetization is not then required; a spring also sliding under E, lightens the latter, and without bringing the knob nearer to W W, renders its attraction more easy: both wedge and spring will be found useful.

Since battery connexion is broken by the apparatus itself, and at the moment the magnetism and excitement of the helix have reached their highest intensity, the circumstances are, in consequence, most favourable for the production of the desired effect; hence, to break connexion by a separate mechanism, or by regulating the wedge and spring of the apparatus itself, though it increase the number, cannot augment the violence of the shocks. This was shown by experiment; and it was said to be in accordance with the belief of Dr. Faraday, who says, (Phil. Trans. 1832,) "that a magnet, even of soft iron, does not arrive at its fullest intensity in an instant." The mercury cups are arranged so that the experimenter may connect the extremities of the helices, the cylinders, and the battery, as he pleases. That contact, when broken, may be broken with great rapidity, the wire E is attached to the longer arm of the lever.

It is said, Mr. M'Gauley continued, that mere metallic contact, without mercury cups, is sufficient, and he hoped it was so; but he had reason, from experiment, to fear, that a pressure of the metals, incompatible with the delicate action of the machine, would be required. Besides many, and he was induced to hope important differences, between this and other contrivances, he thought it right to remark, in anticipation of what, perhaps, might be said, that the coils used by Dr. Faraday and Professor Jacobi were not the same as the present; and the importance even of the manner of *coiling* the wire, may be inferred from the fact, that out of four arrangements, the same in every respect except the coiling of the wire, none was at all comparable in effect with the one exhibited. Dr. Faraday's coils, as they were nearly of the same lengths—(paper read before the Royal Society, Jan. 29, 1835: *Athenæum*, No. 391)—must have been placed beside each other in the same stratum on the bar; and Jacobi (Scientific Memoirs, part 4) coiled the wires together in *one helix*.

That the action of the apparatus was very great, was, he observed, manifest to all present; and he had not known any person, when it was in order, as it then was, able to retain the hands, wetted with water, on the cylinders for an instant; nor, very frequently, the hands even unwetted. With this apparatus we have a very convenient means of trying the beautiful experiment of Dr. Faraday, repeated by Jacobi. They found that when two wires were coiled in a parallel direction, and the extremities of one of them united, the spark and shock were diminished or destroyed; in addition, we find the magnetizing power of the battery lessened, or altogether interrupted, for the bar W W is no longer able to attract E as before. Dr. Faraday had ascribed the disappearance of the secondary current to the produc-

tion of a current in the parallel wire, which current, had that wire not been present, or had its extremities not been united, would have been found in the conducting wire itself; and he supposes the parallelism of the wires to be necessary in the arrangement, yet, in the present case, the wires are not parallel, though the effects remain unchanged. It is possible to unite the extremities of helix B with the helix of an electro-magnet, in such a manner as to excite the latter. When the apparatus is made to act so weakly as that the hands may be retained on the cylinders for a number of rapidly succeeding shocks, it is sometimes very difficult to disengage them. He was induced to believe, that increasing the number of galvanic circles, without diminishing the size of plates, would increase the effect. He found it more useful to increase the energy of the battery by strengthening the acid mixture, than by enlarging the plates. When too powerful a battery is used, rendering the contact between some of the connecting wires less perfect made the machine uniform in its action. Jacobi says that, in his experiment, increasing the battery did not increase the effect; but Mr. M'Gauley showed the contrary, by experiment, in this case. Still, whatever was the reason, he observed, he did not, even in an arrangement similar to that of Professor Jacobi, find that a very small battery produced an effect equal to that of a larger one: so much do circumstances, unnoticed or unappreciated, sometimes alter, not only the extent, but the nature of results.

Mr. Holden made a communication respecting the Atmosphere of the Moon.

Mr. Holden stated that he had been for many years in the habit of making astronomical observations: and that many, which he had made upon the moon, convinced him that that luminary was surrounded by an atmosphere, although it was the ordinary opinion expressed by astronomers, that she either had no atmosphere, or one of such extreme tenuity, as to be practically none. That this was the ordinary opinion of astronomers, he proved by a reference to the work on Astronomy, lately published by Sir John Herschel. Now, the first argument that he should use for proving that she had, was by showing the probability that she had large collections of waters on her surface; for it was admitted on all hands, that if she had not an atmosphere, she could not have a collection of waters; and if she had a collection of waters, she could not be without an atmosphere. The argument urged by astronomers against her having such a collection of waters, was the irregularity of the line which bounded light and darkness upon her surface when she was not full. This, he contended, was no proof, for if a person were looking down upon a shallow sea, the irregularities of the bottom of that sea would be clearly seen at the places which were enlightened, while the deep parts would give dark lines, and the shallow parts brighter lines, near the boundary of light and darkness; and, in fact, he stated that the configurations which he had frequently watched, for the very purpose of forming a judgment, had all the appearance of such an irregularly deep sea. The second argument he used was that in which the cusps or horns of the new moon, during certain spring months, were found to extend very considerably beyond the diameter of the moon, which was perpendicular to the line joining the sun and moon, beyond which diameter, he contended, that the horns ought not to extend, if the direct light of the sun only reached them tangentially, and she had not an atmosphere which should first bend down the rays, and cause them to illuminate beyond the line of the direct tangential course. His third argument was derived from the fact, that fires were seen on the surface of the moon; this he proved by quotations from the work of Sir John Herschel and other astronomers, and to the correctness of their assertions he said he could bear ample testimony from his own experience, having frequently seen them. Now, it was admitted on all hands, that there could not be fire without air to support it; and, therefore, he concluded an atmosphere existed about the moon. His fourth argument was derived from a fact which he had often observed: when the dark edge of the moon caused an occultation of the fixed star, the star appeared frequently to delay its disappearance, and to appear thrown a small way in upon the body of the moon; this he defied the ingenuity of man, however wedded to false opinions, to gainsay or to resist.

Professor Stevelly stated, that without intending to deny the fact that the moon might have a slight atmosphere, he conceived that some of the arguments of Mr. Holden did not, by any means, tend to that conclusion. Chemists knew many instances of combustion, or fire, where there was not oxygen existing as an atmosphere to support it; thus, gunpowder may be inflamed out of contact of air, its nitre supplying the oxygen to consume its sulphur and carbon; and in other cases where oxygen was developed, and in some where merely violent chemical action took place between two substances. He admitted, indeed, that in most of these cases air and vapours would be generated, thus furnishing the sources of existence to a slight atmosphere. Again, as to the cusps of the moon at new, extending beyond the diameter: the moon being a very small globe, and the sun very large, it was easy to see that the sun's light must illuminate more than a hemisphere of the moon's surface, and, therefore, that the extension of the cusps might be accounted for, the exact extent not having been accurately stated, numerically, by Mr. Holden; besides, the extension of the cusps on Mr. Holden's principle, would arise from a kind of twilight, and, therefore, there should be a marked difference between their light beyond the diameter and within it.—Mr. Holden replied, that he had never actually measured the extent of the cusps beyond the diameter of the moon, but he had no doubt from their appearance beyond the wire of the telescope, when placed as a diameter, that they must have extended 15°; and this could not possibly have been caused but by the refraction of the sun's light. The moon, he admitted, had no twilight.—Mr. Peacock said, that in a question of this kind, where everything depended upon accurate measurement, and where the most experienced eye was liable to be deceived by mere appearances, he did not think any weight whatever should be attached to such loose guesses.—Mr. Lubbock feared that the projection of the fixed stars, just before occultation, upon the body of the moon, which was a fact which had been frequently observed, would afford no confirmation to Mr. Holden's theory; for Sir James South had observed that some stars, as Aldebaran, were more frequently thus projected than others, and sometimes one star was projected on the same night that another was not. Nay, two observers have been looking through different telescopes at the same star when about to suffer occultation, and through one telescope it was observed to be projected upon the moon, but not through the other.—Sir David Brewster could not agree in the opinion advanced by Mr. Holden, that the irregular boundary of light and darkness was caused by the bottom of the sea being seen by reflection, and differently in deep and in shallow places, for in that case the manner in which the light would be polarized after such a reflection, would soon detect the fact. In truth, that part of the moon's surface, which, in old maps, was laid down as the Mare Orisium, was, in this way, clearly shown not to be a sea at all, but a continent. All the observations of Mr. Holden upon the cusps of the moon, he would find that Schrœter had been acquainted with, and commented upon long ago.

Lieut. Morrison then gave a description of an instrument for Measuring the Electricity of the Atmosphere. He produced a neat instrument to the Section, consisting of a glass cone about four inches in diameter at the base, surmounted by a brass ball, and a wire about two feet in length. Within the glass is a small magnet, suspended by a gold thread, attached to the lower extremity of the wire. The use of this was to collect the atmospheric electricity according to the commonly received views. The action of the electricity, Lieut. Morrison said, was shown by a deflection of the needle, the *direction* of the deflection indicating the kind of electricity and the *amount*, being an index of the intensity of the electricity of the atmosphere at the time of observation; when that was positive, he said that the needle would be deflected to the east, when negative towards the west. In some instances, he had known it to be deflected quite round to the south. He detailed a number of observations which he had made in various places, and spread over several months, in which 94 times in 100 the instrument detected electricity in the air. The result of five days observations, made last August at Cheltenham, the weather being very tempestuous, were—

75	Observations showed positive electricity	—intensity,	60°.3
22	- - - - negative ———,	ditto -	12°.5
13	- - - - no electricity.		
110			

Several questions were put to Lieut. Morrison, tending to a clearer understanding of what he stated to be the action of the instrument. It seemed to be the general opinion, that the action of this instrument depended on some other agency than common electricity. In reply to a question from Mr. Addams, Lieut. Morrison stated, that if the conducting wire were electrified by a common machine, no deflection of the needle would take place. This seemed to be decisive.

Section B.—CHEMISTRY AND MINERALOGY.

WEDNESDAY.

Mr. Black communicated a paper 'On the Influence of Electricity on the processes of Brewing.'—According to his statements, a thunder-storm not only checks the fermentation of worts, but even raises the gravity of the saccharine fluid, and developes in it an acid. This effect is principally witnessed when the fermenting tun is sunk in moist earth, and may be obviated by placing it upon baked wooden bearers, resting upon dry bricks or wooden piers, so as to effect its insulation. Mr. Black also stated, that during the prevalence of highly-electrified clouds, the fabrication of cast iron does not succeed so well as in other states of the atmosphere.

Dr. Thompson made some observations, tending to show, that fermentation is a process influenced by circumstances the nature of which we are not in a condition perfectly to appreciate; but he expressed his conviction, that the proposition of Mr. Black would, if acted on, prove beneficial to those practically interested in fermentation.

Dr. Apjohn next exhibited a new variety of Alum, upon the subject of which he had lately read a paper before the Royal Irish Academy. This mineral, which he received from Mr. Atherton, an African gentleman, was found on the eastern coast of the African continent, about midway between Graham's Town and Algoa Bay. It occurs in fibrous masses, very similar to asbestos, having a beautiful satiny lustre, and splitting into threads which would appear to be quadrilateral prisms. In taste, solubility in water, and relation to several re-agents, it closely resembles ordinary alum, but is distinguished from it by containing protoxide of manganese, instead of an alkali, and by not assuming the octahedral form. In symbols it is represented by

$$(3\,S\,O_3+Al_2\,O_3)+(S\,O_3+Mn\,O)+25\,H\,O,$$

a formula identical with that which belongs to the entire genus of alum salts. Dr. Apjohn briefly alluded to the other varieties of alum, both those in which the alkalies replace each other, and those in which the alumina is replaced by the deutoxide of iron, chrome, or manganese; and pointed out the theoretical possibility of an alum containing no metal but manganese.

This communication gave rise to much discussion. Doctor Faraday stated, that a specimen of the mineral in question was given to him in London, that he had found it to contain oxide of manganese, and that on this account, and because of the absence of an alkali, he hesitated to admit it as a true alum; and that supposing, as conjectured by Dr. Apjohn, a double salt should be formed, in which the alumina and alkali of ordinary alum were replaced by equivalent quantities of the deutoxide and protoxide of manganese, he could not admit it to be considered as an alum at all.—Dr. Clarke took up a different ground, and objected to the term alum being applied to the salt in question, inasmuch as it could not be made to assume the octahedral form.—To the first objection Dr. Apjohn replied, that he considered the mineral he had examined to be an alum, because, according to his analysis, its composition accorded with the general formula for alum; and to the second, that the other well-known alums presented other difficulties of as great magnitude as respects the laws of isomorphism. That, *e. g.* soda alum crystallizes as an octahedron, though soda is not usually considered isomorphous with the other alkalies; and

that, though the different varieties of alum assume the same form, they are not by all chemists considered to contain the same amount of water of crystallization.—Professor Johnston concluded the discussion by suggesting, that the difficulties which had arisen might be easily surmounted, simply by gentlemen agreeing upon a definition of what did or did not constitute a true alum.

Dr. Apjohn then exhibited to the Section a new and very complicated compound, including iodide of potassium, iodine, and what he denominated Cinnamile, from its analogy to benzoyle, the hypothetic base of the essential oil of almonds. This compound formed accidentally during the prevalence of cold weather, in a mixture prescribed by a physician, and which contained iodide of potassium, and iodine dissolved in cinnamon water, prepared by the ordinary pharmaceutical process. It was first particularly noticed by Mr. Moore, of Ann Street, Dublin, in whose establishment the prescription was made up. He made several experiments upon it, and having furnished Dr. Apjohn with a specimen of it, they undertook conjointly the further determination of its properties, and the investigation of its composition. It occurs in long capillary four-sided prisms, of a beautiful bronze aspect, melts at about 63°, dissolves in alcohol and ether, but is decomposed by water. This latter menstruum, however, has no action upon it when it holds iodide of potassium dissolved, or probably other kinds of saline matter. Mercury effects its decomposition, an iodide of mercury being formed, iodide of potassium, with (probably) cinnamile, being liberated. By an elevated heat it is decomposed, iodide of potassium being left, with a considerable quantity of charcoal, while iodine, and an organic vapour smelling of the oil of cinnamon, pass off. Dr. Apjohn stated, that according to his experiments, which however were not completed, it would appear to be composed of one atom of iodide of potassium, associated with two of the subsesqui-iodide of cinnamile, as represented by the following formula:

$$\mathrm{I\,K} + 2\,(\mathrm{I}_{2}\ \mathrm{Cin.}_{3})$$

This he stated to be the formula which most nearly expresses his analytic results: but he added, that he did not place much confidence in them; and that, not having as yet been able to effect the combustion of the compound with oxide of copper, he should not be surprised at finding this formula materially corrected by the results of the further researches with which he stated himself and Mr. Moore to be at present occupied.

Doctor Kane did not think that the insulation of cinnamile was an object of any interest, and cautioned the Section against receiving, as accurate, the formula given by Dr. Apjohn.—Dr. Apjohn, observed, that this caution was unnecessary, as he had himself stated, that he did not place much confidence in his results, and that he contemplated renewed researches on the subject.

The next paper was a communication by Professor Graham, on the subject of the Inorganic Salts, and in particular, the function which water discharges as an element of their composition. Professor Graham had been requested, at the meeting of the Association held in Dublin, to report at some future meeting on the present state of our knowledge of saline bodies; and his communication to the Section was understood to have been made, with the view of discharging the duty which had been thus imposed on him.

The Professor developed at some length his own views respecting the constitution of salts. The hydrated acids are unquestionably salts, having water as base, and they correspond in a remarkable manner with the salts having for base magnesia, oxide of zinc, oxide of copper, or any other oxide isomorphous with magnesia. Hence water as a base belongs to the magnesian class of oxides. Super or acid salts have two bases, of which water is one. They are double salts, and correspond with the double salts of the same acids containing magnesia, oxide of copper, &c. Thus the salt called the binoxalate of potash is really a double oxalate of water and potash, and corresponds in constitution with the double oxalate of copper and potash, as will be seen on comparing their formulæ below:—

$$\dot{\mathrm{K}}\ \overset{\cdots}{\mathrm{CC}}\ \dot{\mathrm{H}}\ \overset{\cdots}{\mathrm{CC}}\ \dot{\mathrm{H}}^{2},\ \text{and}$$

$$\dot{\mathrm{K}}\ \overset{\cdots}{\mathrm{CC}}\ \dot{\mathrm{Cu}}\ \overset{\cdots}{\mathrm{CC}}\ \dot{\mathrm{H}}^{2}.$$

Mr. Graham's researches tend to prove that all salts are neutral in composition, with the exception of certain specified classes. One of these classes is the phosphates, of which there are three kinds, containing respectively one, two, and three atoms of base to one atom of acid, and for which the names of monobasic, bibasic, and tribasic phosphates are proposed, in substitution for the old names of metaphosphates, pyrophosphates, and common phosphates. In some of the tribasic phosphates, the three atoms of base are all different, as in microcosmic salt, in which we have an atom of soda, ammonia, and of water, all united together, to one atom of phosphoric acid. Only one class of arseniates exists, but it is the tribasic class; it is likewise probable that the phosphites are all tribasic, but all the other classes of salts, at present known, such as the sulphates, nitrates, &c., are monobasic. In the case of those combinations which are at present called subsalts, Mr. Graham finds that there is really only one atom of base to one atom of acid. In the ordinary neutral salts, such as nitrate of copper, we have several atoms of water in combination with the salt, and known as water of crystallization, but which Mr. Graham distinguishes as constitutional water. Now it appears that metallic oxides may be substituted for this constitutional water, and it is in this way that subsalts come to be produced. Thus the salt called subnitrate of copper is really a nitrate of water with three atoms oxide of copper attached to that combination in the place of water of crystallization. The nitrate of water, or nitric acid of specific gravity 1.42, the nitrate of copper, and the subnitrate of copper, are all of similar constitution, and are represented by analogous formulæ, viz.,

$$\dot{\mathrm{H}}\ \overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{N}}\ \dot{\mathrm{H}}^{3},$$

$$\dot{\mathrm{Cu}}\ \overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{N}}\ \dot{\mathrm{H}}^{3},$$

$$\dot{\mathrm{H}}\ \overset{\cdot\cdot\cdot\cdot\cdot}{\mathrm{N}}\ \dot{\mathrm{Cu}}^{3}.$$

These formulæ illustrate the constitutional neutrality of salts. In each of them we have one atom only of oxide in the relation of base to the acid, (which is expressed by placing its symbol to the left of the symbol of the acid;) while in each salt we have three atoms of oxide in another and totally different relation to the acid. Certain salts appear to be capable of combining with anhydrous acids, and then a new order of saline combinations is produced. The sulphate of potash and chloride of potassium absorb anhydrous sulphuric acid without decomposition, as has been proved by H. Rose. The red chromate of potash is analogous to Rose's salts, but more permanent. It is not a true *bi*chromate of potash, but a binary combination of chromic acid with the neutral chromate of potash without any water. The red chromate of potash is therefore not an exception to the law, that all salts are neutral in composition. It is well known that all the ordinary salts of ammonia contain an atom of water, which forms part of the base, and that they may be represented as containing the oxide of a hypothetical radical ammonium. Mr. Graham considers water as the true base of these salts, and that ammonia is not a base itself, but belongs to a class of bodies which may be called *basic adjuncts*, which admit of being attached to the oxide of hydrogen or to the oxides of metals, the only true bases. Thus the sulphate of ammonia is truly the sulphate of water, with ammonia as a basic adjunct. The sulphovinates contain sulphate of water, with olefiant gas as a basic adjunct. The nature of the constitution of the combinations of dry salts with ammonia can now be explained. In these combinations the metallic oxide is in the place of the basic water of the ordinary ammoniacal salts. Thus, chloride of hydrogen (muriatic acid) combines with one atom of ammonia; chloride of copper does the same thing, and the ammonia cannot be expelled or separated by heat in either case. These combinations are represented by analogous formulæ:

$$\mathrm{NH}^{3}\ \mathrm{H\ Cl},\ \text{and}$$

$$\mathrm{NH}^{3}\ \mathrm{Cu\ Cl}.$$

Anhydrous sulphate of copper absorbs, at an elevated temperature, half an atomic proportion of ammonia, and retains it by a most powerful affinity. It is curious that in similar circumstances oil of vitriol or the sulphate of water absorbs the same proportion of ammonia, the bisulphate of ammonia being produced. The two products are of the same constitution. The basic adjunct, ammonia, is attached to oxide of copper in the one case, and to oxide of hydrogen in the other. Both are double salts and may be expressed by the following formulæ:—

$$\dot{\mathrm{Cu}}\ \dddot{\mathrm{S}} + \mathrm{NH}^{3}\ \dot{\mathrm{Cu}}\ \dddot{\mathrm{S}},\ \text{and}$$

$$\dot{\mathrm{H}}\ \dddot{\mathrm{S}} + \mathrm{NH}^{3}\ \dot{\mathrm{H}}\ \dddot{\mathrm{S}}.$$

It thus appears that the ordinary ammoniacal salts which contain water, are a particular class of an extensive order of salts; as, for the water there may be substituted oxide of copper, oxide of zinc, nickel, cobalt, and many others. Many of these combinations are capable of assuming an additional dose of ammonia, which, however, is feebly retained, and is in a relation to the salt like that of water of crystallization.

Mr. Richard Phillips gave it as his opinion, that the difference between constitutional water and basic water arises from the well-known law, that when one principle combines with more proportions than one of another, the first proportion is held with a stronger affinity than the others.—Mr. Bird could not conceive how water could be considered as a base, and inquired what view Professor Graham would take of the function of the atom of water in oil of vitriol and in caustic potash.—Dr. Faraday expressed his satisfaction that such a variety of opinions should be advanced, and even maintainable by powerful arguments, upon so interesting a subject; for, from this collision of opinion, it was most likely that the truth would ultimately be struck out. He also cautioned chemists against considering electrical relations as affording, in every instance, conclusive proofs of what is a base and what is an acid.—Mr. Johnston concurred in the observation of Dr. Faraday, and professed that he had a very strong leaning to the theoretical views in reference to the constitution of salts which had been just propounded by Professor Graham.—Dr. Kane made some remarks on the same subject, objecting to some of Professor Graham's statements. To these Professor Graham briefly replied, and the discussion closed.

Dr. Clarke then came forward, and explained his method of facilitating the Calculations of Gases.—The principle of his suggestion is illustrated by the following table, in which the atomic weights of different gases, the numbers being supposed to represent grains, are reduced, in the last column, to cubic inches.

	Eq.	Cubic inches.
Oxygen	8	23.4
Hydrogen	1	46.8
Azote	14	46.8
Carbonic acid ..	22	46.8
Nitric Oxide ..	30	93.6

This plan he had, from experience, found to be admirably suited to the purposes of instruction, and, in particular, to obviate the difficulties invariably experienced by the chemical tyro in practically applying the doctrine of volumes.

A letter was next read, addressed by Mr. Locke to Mr. W. W. Currie, of Liverpool, in which the latter was requested to propose as a question, to the philosophers assembled, whether, in the case of a monument 140 feet in height, erected on the summit of a mountain 1400 feet high, augmented safety or danger would be the consequence of attaching to it a conductor or paratonnerre. The column is sandstone, the mountain conglomerate, and in the vicinity of the latter there is a mountain of still greater elevation.—It was resolved, that this letter should be, *pro formâ*, put into the hands of Mr. Snow Harris, though no doubt whatever was felt as to the answer which it would be proper to give to such an inquiry. The efficacy of the protectors of Franklin in every possible situation, provided they be constructed upon proper principles, and mounted in a suitable manner, is now universally admitted.

The following letter, addressed by Professor Hare, of Philadelphia, to the illustrious author of the Atomic Theory, was then brought before the Section:

"Philadelphia, Aug. 14th, 1837.

"DEAR SIR,—I beg leave, through you, to communicate to the British Association for the Advancement of Science, the fact, that, by an improvement in the method of constructing and supplying the hydro-oxygen blowpipe, originally contrived by me in the year 1801, I have succeeded in fusing, into a malleable mass, more than three-fourths of a pound of platina. In all, I fused more than two pounds fourteen ounces into four masses, averaging, of course, nearly the weight above mentioned. I see no difficulty in succeeding with much larger weights.

"The benefit resulting from this process is, in the facility

which it affords of fusing scraps or old platina wire, into lumps, from which it may be remodelled for new apparatus.

"The largest masses were fused agreeably to my original plan of keeping the gases in different receptacles, and allowing them to meet during efflux. I have, however, operated, in the large way, upon the plan contrived and employed by Newman, Brookes, Clarke, and others, having employed as much as thirty gallons, in one operation, of the mixture of the gaseous elements of water. This I was enabled to do with safety, by an improvement in Hemming's safety tube. In this improved form, I have allowed the gas to explode as far into the tubes of efflux, as the point where the contrivance in question was interposed, at least a hundred times, without its extending beyond it.

"Still, however, the other mode in which gases are separate, until they meet in passing out of their respective receptacles, is less pregnant with anxiety, if not with risk. As these elements are known to explode by the presence of several metals, other mysterious modes may be discovered.

"Having made a self-regulating reservoir of chlorine, by suspending lump peroxide of manganese in concentrated chlorohydric acid, I was surprised by a violent explosion, on presenting leaf metal to the jet tube. I had made similar apparatus before, and have repeated the process with the same materials since, without a repetition of the explosive reaction. It might be inferred, that the protoxide of chlorine was generated, but the colour of the gas was so inferior in intensity to that of chlorine, as to lead me to suppose, that there was some irregularity, before testing it with Dutch gold leaf. It has occurred to me, that there may be a dichloride of hydrogen which may explode with chlorine, and that of these the mixture consisted which produced the phenomenon in question.

"In freezing water by the vaporization of ether, the labour of pumping is lessened, and the pump protected from a disadvantageous introduction of the vapour, by interposing sulphuric acid. If the stem of a funnel, with a cock, be luted in the tubulure of a retort, the beak of the latter into the neck of a receiver, of which the tubulure communicates with an air-pump, on placing water in the funnel, ether in the retort, and sulphuric acid in the receiver, and exhausting; then allowing the water to descend into the ether, the congelation of the water is rapidly effected. Of course, the acid absorbs the etherial vapour with great force, and the resulting mixture, or rather combination, requires a temperature of at least 280° for its ebullition. This is less consistent with the doctrine of Mitscherlich than that of Hennell. It does not appear reconcileable with the idea, that the process of etherification is one of "*Catalysis*" or of the action of "*presence*."

"I sent to Mr. E. M. Clarke a rotatory galvanometer, which I have lately contrived.

"I need not say how much I regret that the Atlantic rolls now between myself and those respected and esteemed brethren in science whom, this time last year, I had the honour and pleasure to meet and to greet at Bristol, and to whom I shall ever be grateful for their kind reception. How much would it gratify me, could I exhibit to them, and their enlightened visitors, that splendid concentration of heat and light which I have lately employed, by which a metal infusible in the air-furnace or forge is made as fluid as mercury, so as to be blown off in globules.

"With the highest esteem,
"I am, respectfully,
"Yours,
"Robert Hare.

"Dr. Dalton.

"P.S.—I beg leave to avail myself of this opportunity of stating, that the light used for the hydro-oxygen microscope, and produced by the hydro-oxygen flame with lime, was described in my original memoir, re-published in the 14th vol. of Tilloch's *Philosophical Magazine*, where it is mentioned as being insupportable to the eye. This has been improperly since called *Drummond's* light. A premium has been since given to Mr. Maugham, for a modification of my blowpipe, without the smallest reference to the inventor. It will be remembered, that I exhibited at the meeting of the Chemical Section last year, a blowpipe used by me for twenty years nearly, and of which an account was published, fifteen years since, in the Franklin Journal, which does not differ materially from that published as the contrivance of my friend Professor Daniell."

Section C.—GEOLOGY AND GEOGRAPHY.

WEDNESDAY.

On the opening of the Section, Mr. Greenough exhibited a Geological Map of France, coloured by Messrs. Elie de Beaumont and Dufrénoy. Of this map only two copies have been finished; one for the French government, and the other had been sent over to be shown at the present meeting. The origin of this map was, the publication, several years ago of a Geological Map of England; at which time some French savans came to England to examine the plan of its execution. Mr. Greenough stated also, that in 1835, at the meeting of the German Association at Bonn, it was agreed that the scale of uniform colours should, for future maps of all countries, be left to the selection of British geologists.—Mr. Griffith mentioned that a new edition of Mr. Greenough's Geological map of England was in progress; and stated, that it is of the highest importance to establish, as soon as possible, an uniform scale of colouring.

Dr. Traill then came forward and stated, that as his communication yesterday on the Geology of Spain [see p. 683] had been made near the close of the Section, he would recapitulate very briefly the sum of his observations, and range them in the following table:

Tertiary strata had been observed by him in Andalusia and Arragon.
Chalk—near Seville.
Oolite—in New Castile, Arragon, and Andalusia.
New red sandstone—in all these districts.
Mountain limestone—in the mountains of Andalusia and Valencia.
Old red sandstone—in Arragon and in the S. of Andalusia.
Clay slate—in the Sierra Morena, Montserrat, Pyrenees, &c.
Mica slate—Sierra Nevada and Pyrenees.
Granite and gneiss—Galicia, Guadarrama, and Pyrenees.

The first regular communication of the day was from Mr. Henwood, 'On some of the Phænomena of Mineral Veins in Cornwall.' This gentleman has for several years examined these phænomena in that important mining district, often at great personal risk, and has from time to time communicated to the geological world many extraordinary facts which he had determined. He brought before the Section his present statement, in the shape merely of a question for solution, as important to the Cornish mining interest. In mines, veins are often heaved out of their regular course, and are traversed by cross courses, causing farther irregularity. It was a desideratum of the first importance, that a law should be determined by which a heaved vein could again be discovered; and the opinion of geologists was requested on this point. In Cornwall, it is also the opinion among miners, that veins are of contemporaneous formation with the rocks containing them, which opinion is opposed to that of geologists in general, who consider veins, in most cases, as caused by disruption from mechanical force. Mr. Henwood exhibited a diagram of heaves in the mines of Dolcoath and Huel Prudence, which he submitted to the Section for solution by means of mechanical movement. He himself was inclined to consider the veins in these mines as of contemporaneous origin with the rocks in which they are found. The heaves he had ascertained to be in one and the same direction; and he conceived that, had they been caused by a mechanical force, they would be found in different directions.

Mr. Hopkins believed there was no difficulty in solving Mr. Henwood's question, by reference to the operations of mechanical force, but several data were necessary at the outset. He was fully aware of the difficulty of miners recovering lost veins, and that it was highly desirable to have rules laid down for doing so. He entered into a disquisition upon the formation of veins in general, and first stated the theories that had been proposed to account for them. One was that of the Cornish miners, as above stated. Another, that fissures in the rocks had taken place after their consolidation, which fissures had become filled subsequently with mineral matter: these fissures being either open cracks, or simply discontinuities of the strata. Mr. Hopkins referred to his paper in the Transactions of the Cambridge Philosophical Society, where the subject was treated mathematically. He considered the idea of the contemporaneous origin of veins as having no claim to the name of a theory, from its assigning no physical cause—it does not even call in the aid of electric agency. Suppose even that a small mass of matter were acted on and modified by fire, it might present veins within it; but still no theory is assigned why these veins are so produced: here there is the action of fire, and consequently, after being acted on, the phænomenon may be regarded as effected by igneous agency;—yet how can this explanation be applied to sedimentary rocks?—to say, therefore, contemporaneous formation, is to use an unmeaning term. Suppose it may be ascribed to molecular attraction, still the cause is wanting; and although it might be of some avail in explaining the formation of globular masses, yet it is of no use in the present case, as we have to do with masses occurring in planes. In order to solve Mr. Henwood's question, we must know the angles which the veins make with each other, and also with the horizon, and the relative height of the strata on each side of the lines of dislocation. Mr. Hopkins considered that Cornwall was an unfavourable county for explaining these phænomena, as its rocks were generally unstratified; and he would prefer a county like Derbyshire, where the regularity of the stratification offered much facility in finding the necessary data.—Mr. De la Beche considered Cornwall as perfectly suited for explaining these phænomena on Mr. Hopkins's theory. In this county there exists a fossiliferous system, which has manifestly been upheaved by the granite, and is penetrated by the same granite veins which traverse the primary rocks.—Mr. Phillips said that we should not restrict the term contemporaneous, the real point urged by the Cornish miners being, that there was no displacement. Still we must seek for explanation in other districts. In these, the mechanical theory must be at once acknowledged to be true, when we see the disturbance in fossiliferous rocks, in some cases even in an intersection of their organic remains. But this theory ought not only to explain the direct phenomena, but must account for the exceptions; and in such cases, as in Cornwall, we must regard the structure of the rocks—their regular divisions and joints, which are independent of stratification,—veins may even occur in these divisions. In the north of England, the contents of veins are found to vary according to the containing rocks; and he considers the circumstance of spar stuff occurring in the Cornish veins as not opposed to the idea of mechanical force, but as dependent upon electric agency.—Mr. Taylor, jun. stated, that, in the course of his experience in practical mining, he had observed certain conditions necessary for the profitable working of metals. In the oldest, or scar limestone, he had observed that the miner was not remunerated; but in newer lead measures he had a better chance of success, as in grits and shales. The best chance was in altered rocks. In Cardiganshire he had observed a remarkable case in a slaty rock: where very schistose, the workings were poor; but where the rock was *diced*, as the workmen call it, they were certain to be rich: the strike of the altered rock being N. and S., and that of the veins E. and W. He had seen remarkable proofs of the mechanical theory in North Carolina, especially in the rich veins of iron ore of that country.—Mr. Sedgwick instanced the discussion now before the Section, as a proof of how much one branch of science was assisted by another: we here saw the application of Physics to Geology; he could record also the assistance rendered by Geology to Physics. This same Dolcoath mine, whose phænomena of veins were so singular, was the one selected by Prof. Airy for determining the density of the earth. Mr. Sedgwick remarked, that fissures caused by crystallization were, in general, very small; and that joints seldom coincided with rents:—that in districts where granite approaches slate rocks, we may be certain of finding the richest metalliferous deposits. Practical miners had often whimsical ideas of the origin of metals. One of them had once gravely informed him that they were caused by *peat*, and had shown what he conceived to be a convincing proof, namely, their existence under a peat bog in his neighbourhood, and occurrence nowhere else in the same vicinity.—Sir W. R. Hamilton testified also to the importance of new applications of mathematico-physical science. Not only would new views open, but even new methods of analysis would arise to assist the investigator.

Dr. W. H. Crook made some observations on the unity of the Coal Deposits of England. The object of this communication was to show that the coal-fields of England and Wales were not *distinct* basins, but that, the supposed basins were only portions, which had been detached and elevated by the agency of sienitic and trap rocks, of a much larger deposit, spread over the greater part of the districts now covered by the new red sandstone. Of the vegetable origin of coal there is now no doubt: the only question unsettled is, did the plants supplying it grow on the spots where it is found, or were they transported? Dr. Crook inclined to the latter opinion, and conceives that this view may be extended to the coal of Belgium, of the north of France, and the north-west of Germany; the carboniferous beds of those countries having originated, in his opinion, in a drift of vegetable substances from countries lying to the east or E.S.E. of them; and he also thought, that the extent and richness of the English coal-fields especially in the Midland counties, arose in a considerable degree, from the impediments offered to the transit of the drifted matter by the slate and other ancient formations of Wales and Cumberland. He considered that the Charnwood Forest rocks had elevated the coal-field near it, and a similar elevation had taken place at Nuneaton.

Mr. Greenough considered the idea of Dr. Crook as very probable; but observed, that the deepest

of our coal basins has been found to be in South Wales.—Mr. Young, from Nova Scotia, stated, that large deposits of coal had been found in that country.

Mr. Sedgwick requested the attention of the Meeting to an account, which he was about to submit, of the late unfortunate accident at the Workington Collieries. He pointed out, on the geological map, the rocks which occur in that neighbourhood, and stated some of the phenomena of the stratification of the coal measures, which are there very much disturbed. There is an anticlinal line, on the opposite sides of which the strata dip differently, so that, in one place, very important beds of coal crop out under the sea. Workings, quite submarine, have accordingly been carried on for some time: in the Isabella pit, a depth of 135 fathoms under high water has been reached. A culpable want of caution has been shown by the managers of late, as they have caused the workings to reach too near the sea—even within fourteen fathoms of it; and the pillars and roof of the older works had been taken away, by which the danger was greatly increased. There had been repeated warnings from the shrinking of the ground, and from an old work having become filled with water;—also in the new workings—although the pumping brought up 1000 gallons per minute, the miners were in such danger of being drowned, that several left the employment. In the latter end of July the sea at length broke in, filling the mine in all its parts, in little more than two hours, and destroying twenty miles of railway. On one side of the Camperdown dyke, which ranges through the mine, not a soul was saved, but several escaped from other parts; and one individual, an Irishman, called Brennagh, had not only a remarkable escape himself, but saved three others by his intrepidity. Professor Sedgwick related to the Section this man's story, which was so singular, and told with such a mixture of the serious and ludicrous—often in the language of the man himself—that it is impossible to convey to the reader an idea of the effect produced on the audience. A remarkable fact in the escape of one of the individuals rescued by Brennagh was, that he was actually *blown up* the last open shaft of the mine by the enormous force of the air, the noise of which was heard at a considerable distance in the country. The first notice to Brennagh of the accident, was an unusual undulation of air in the galleries, which made him suspect that all was not right, and he took the precaution of moving near to an air passage in the dyke, which he had been permitted to use: he was thus enabled to save himself and his companions. At the suggestion of the Professor, a subscription was made in the Section for Brennagh, which amounted to 34*l.*

Mr. Ham, of Bristol, communicated the result of his investigations on the mud of the Severn, into the embouchure of which river (he said) the tide flows higher, and with greater impetuosity,—consequently, repels more forcibly the current of fresh water,—than in any other river in the known world. The tidal wave changes the current of the tributary streams at the mouth of the Severn, and it is occasionally forced up the Wye to a height of sixty feet, and with a velocity of nearly nine miles in the hour. A consequent agitation of water takes place in the embouchure, and, in narrow channels, the fresh water is actually driven back by the force of the tide. The mixture, however, is effected where the channel is wide, and the bottom full of inequalities; and, in this case, there is a constant regularity in the specific gravity at the same season of the year. Observations made in the month of August, from 1822 to the present year, making it 1020—water in the middle of the ocean being generally 1028. There is manifestly a great evaporation in summer from so large a surface of water as that which forms this estuary; and Mr. Ham conceives the loss to be greater than is supplied by the tributary streams. He therefore supposes that the same identical water, or nearly so, is kept oscillating to and fro, by the force of the tide. On the Welsh coast, the water, being shallow, has a higher temperature (67° in August) than that on the opposite side (65°); and on the Welsh side Mr. Ham found the greatest quantity of mud. He ascertained, that at the mouth of the Avon the water contains 26.3 grains in every imperial gallon—in the deep channel 28.5—at the beginning of the shallows 35.0—on the opposite coast 72°—at the mouth of the Usk it was found to be 39.5—and the average of these five trials gave 40.3; so that, taking the channel area at 225 miles, the quantity of mud at the depth of one fathom, suspended in the water, would be 709,000 tons! If the quantity of homogeneous mud be the same at equal distances from the bottom, and with equal velocities in the current, it might be possible to prevent the formation of shoals, by so altering the channels that the water may flow with an equal velocity in all their parts.

Specimens from the bone cave of Cefn, in Denbighshire, and from the Ludlow rock, were exhibited.

Section D.—ZOOLOGY AND BOTANY.
WEDNESDAY.

The business of this morning commenced by the President referring to some parts of the proceedings of yesterday, and some points in the economy of animals were discussed that could not have been alluded to in a promiscuous assembly.

A paper was communicated by Mr. Jenyns, from Dr. Williams, on a species of Limax found in the human alimentary canal. In remarking on this case, Mr. Jenyns stated he believed the species to be *Limax variegatus*, and mentioned that Dr. Heberden had communicated to him a case in which the *Limax rupestris* had been found in the same situation.

Some remarks were then made by Professor Henslow, Mr. Curtis, Dr. Travers, and others, on the subject of the mode of introduction of these animals into the abdominal viscera. Several published instances of Coleopterous and other insects being found in the same locality, were referred to.

Dr. Richardson communicated a paper from Dr. Bellingham, on the frequency of the occurrence of *Trichocephalus dispar* in the alimentary canal. The author alluded to the difficulty of accounting for the origin of animalculæ in the human body. To say that they were secreted or not secreted by the tissues of the body, was premature, as we knew so little of secretion itself. Although in some instances parasitic animals produced injurious consequences to the animal they infested, yet in many others no injury was experienced. The Trichocephalus was found in the majority of human beings, but produced no ill consequences. The genus belonged to the division *Nematoidea* of Rudolphi, and contained eight species. The *Trichocephalus dispar* was mostly found in the cæcum, but sometimes occupied the colon and small intestines. It had been found at Göttingen in those who died of fever, and at Naples in those who died of cholera; and was there supposed to be the cause of that frightful disease. Baillie and Bostock had stated it to be rare, whilst French and German anatomists had pronounced it frequent in the generality of the human species. The author states, from his own experience, that out of twenty-eight individuals he had opened, who had died of various diseases, and varied in age and sex—the youngest being fourteen—he had found the *Trichocephalus dispar* in twenty-five. Dr. Richardson added, that in the lower mammalia and in fish, the caeca were frequently found filled, in some literally crammed with Botryocephali, ranging from a yard to a yard and a half in length; and what was remarkable, the animals appeared to be as healthy and vigorous as if they were not infested.

Mr. Selby observed, that he believed the existence of these parasites in fish was perfectly consistent with the most vigorous health.—The Rev. F. W. Hope had seen Rudolphi's museum, who, on inquiry, had informed him he thought these parasites frequently existed without injuring the health of the individual. Mr. Hope believed that these worms were more fully developed in birds and higher animals, than in fish.—Mr. Curtis had had worms sent him which existed in an abscess of the neck, and others which infested the alimentary canal of the pheasant, and which were extracted alive from the animals, by pulling them out of the mouth with a wire.—Dr. Travers had opened seventeen persons who had died of various diseases, but he had met with Trichocephalus in only two cases.

The Rev. Jas. Yates then read the 'Report of Dr. Daubeny on the cultivation of Plants under Glasses without Ventilation.'

In April last, the Doctor introduced into globular glass vessels, their aperture being covered with bladders, three several sets of plants. In the first were *Sedum, Lobelia,* &c.; in the second, *Primula, Alchemilla,* &c.; in the third, *Armeria, Sempervivum,* &c. At the end of ten days the plants were healthy, and had grown. The air in the jars was examined, when it was found that the first had 4 per cent. more oxygen than the atmosphere, the second also 4 per cent. more, and the third 1 per cent. more. This was the result of examination during the day, but at night the excess of oxygen had disappeared. On the eleventh day, the first jar contained 2 per cent., the second and third 1 per cent. excess of oxygen. At night there was less oxygen than in the atmosphere. On the 20th of June the following results were obtained: in first jar 2¼ per cent., in second jar 3¼ per cent., and in third jar 4 per cent. less oxygen than in atmospheric air. Some experiments were then made to determine the rate of access of air to the plants through the bladder, and it was found that when the jars were filled with oxygen, the average rate at which it escaped till the internal air was like that of the atmosphere, was 11 per cent. daily.

Professor Lindley then read a paper by Mr. Ward on the same subject. The Professor observed, that Mr. Ward, of Wellclose Square, London, had made many experiments on the subject of keeping plants in unventilated vessels, and was the original proposer of the plan for preserving plants in this manner. The discovery of their being able to be thus preserved, was of great practical importance, as it enabled us to bring plants from foreign climates, that could in no other way be introduced into this country. The paper commenced, "Consider the lilies *how* they grow." The attention of the author was first directed to this point by accident. He had placed under an inverted jar a chrysalis, and on looking at it some time after, he found a fern and a blade or two of grass had grown under the jar, the sides of which appeared to be covered with moisture. Taking the hint, he introduced some plants of Hymenophyllum under a jar, which grew and flourished in this situation. The Messrs. Loddige then enabled him to perform some experiments on a larger scale. The plants were enclosed in glass cases, or small greenhouses, made tight with paint and putty, but, of course, not hermetically sealed, and were watered once in five or six weeks. From his experiments, the author came to the following conclusions:—First, that confining the air secured a more equable temperature for plants, as its expansion and contraction by change of external temperature, by its relation to heat in those states, prevented any great or sudden change. This was remarkably exemplified in some plants that were brought from India, which were in the course of three months successively exposed to 20°, 120°, and 40° of Fahrenheit. The enclosed plants were very frequently found surrounded by a temperature higher than the external atmosphere. Secondly, that vascular plants required to be grown in a greater quantity of air than cellular. Thirdly, that light must be freely admitted. Fourthly, that the enclosed air must be kept humid. This can be done by occasional watering, provided any means of escape for the water is allowed, but is not necessary where the water has no means of escape. Besides the advantage of enabling us to bring plants from abroad, it would also furnish to the physiological botanist the means of observing those operations of nature in his study, for which, before, he had been obliged to resort to the forest and the plain. As an instance, the author had been enabled to observe the rapid growth of a *Phallus fœtidus*, by merely devoting to it a few hours of the night. The writer concluded by suggesting that this mode of preserving tropical productions might be extended from the vegetable to the animal kingdom.

Professor Lindley also read a letter from the Messrs. Loddige to Mr. Ward, stating that in every case in which his instructions had been attended to, foreign plants had arrived in a state of safety.

The Rev. J. Yates read a paper on the same subject. Wishing, he observed, to make an experiment, on a large scale, which might be exhibited at the meeting of the British Association in Liverpool, a greenhouse, 9 feet by 18 in dimensions, and with a southern aspect, had been erected in the yard of the Mechanics' Institute, in Mount-street. It was stocked with foreign plants of all kinds, to the number of about 80 species. A list of the plants, and observations on

their condition and progress, accompanied the report. The general result of the experiment was, that the plants had flourished perfectly well, being in a vigorous and healthy state, without any extraordinary growth. Many of them had flowered, and Canna and some Ferns had ripened seed. The green-house had no flue, and no provision for any artificial heat. It was judged best to construct it without a flue, both as least expensive, and for the purpose of trying, by a fair experiment, to what extent plants might in this state be kept alive, even during the severity of winter, which would certainly die if fresh air were more freely admitted. It was also to be observed, that nothing had been done to prevent the water from escaping through the yellow sandstone rock, on which the green-house was erected, and hence it had been necessary to give the plants occasionally a fresh supply of water. Mr. Yates further stated, that he had also grown plants under glass in London, where no plant could be made to flourish without such a protection. Nearly a year ago he planted *Lycopodium denticulatum* in a chemical preparation glass, with a ground stopper. During that time the bottle has never been opened; yet the Lycopodium continues perfectly healthy, and has grown very much, although, for want of space, the form of the plant is distorted. Seeds which happened to be in the soil have germinated, and Marchantia has grown of itself within the glass. He also obtained a hollow glass globe of 18 inches diameter, and with an aperture sufficient to admit the hand for planting the specimens. A variety of Ferns and Lycopodiums were then set in the soil, which was properly moistened with water. This having been done, the aperture was covered with sheet India-rubber, its attachment to the glass being made perfectly air-tight. No change of air could take place, except by percolation through the India-rubber, which was every day forced either outwards, as the air within the glass was heated and expanded, or inwards in the reverse circumstance; these Ferns grew probably as well as they would have done in a green-house or hot-house. They were all foreign, and some of them requiring a great heat. Several had ripened seed.

Mr. Gray stated, that he had grown Droseras under glass jars: one circumstance with regard to them he thought worthy of remark, their leaves did not turn red, as is usual when exposed to the atmosphere. Professor Graham observed, that although in Mr. Ward's experiments atmospheric air had been admitted, he did not think it essential to the welfare of the plant. Plants grown in this manner only required a glass large enough to contain a sufficient quantity of air, to permit of the absorption of oxygen without deteriorating the air of the vessel to such an extent as to injure the plant. The want of red in the leaves of Drosera, he thought, depended on the presence of moisture. A singular point was, that plants growing naturally in arid soils and climates, flourished in the humid and confined atmosphere of the closed jars. He had placed under jars completely closed some plants of Cacti, which had flourished more than those not so situated. He did not think that animals could be sustained in the same manner, as they consumed all the oxygen which they inspired.—Dr. Travers remarked, that he had seen common Mould, which was a species of fungus, in a tube which had been heated and hermetically sealed for two years.—Mr. Bowman had observed at the Duke of Devonshire's, Chatsworth, that Droseras did not under the jars change the colour of their leaves as in open air. He wished to know of Dr. Graham, how long his Cacti had lived in a moist atmosphere; they were naturally at certain seasons of the year exposed to heavy rains. He thought it was very possible for plants and animals to live together.—Mr. Duncan inquired if plants were healthy and fit to be transplanted to the open air when treated in this manner. —Professor Graham stated, that the Cacti had lived without accession to air eighteen months. He believed that plants and animals might live together, provided the vessel in which they were inclosed was sufficiently large to enable the plants to absorb the carbonic acid gas expired by the animals. This would be a representation in miniature of what takes place in our own world.—Professor Lindley, in reply to Mr. Bowman's question, stated, that plants suffered little when confined in carefully closed vessels. From improper treatment they may become debilitated, but he had seen them arrive from foreign countries, when treated in this manner, in the most perfect state of health. Want of skill in the management of those brought from abroad was the most frequent cause of injury. Too much water was frequently given to plants when just packed. They had better be placed in too dry, than in too moist an atmosphere. He had seen this illustrated in plants from India; plants exposed to too much moisture rotted very soon. He thought the change of colour in the leaves of plants depended on their free exposure to light: the Droseras mentioned had not been exposed to the free access of light; this was certainly the case with the Droseras at Chatsworth and of Mr. Gray. The discovery of Mr. Ward was not only important in enabling us to import foreign plants, but it also rendered the ventilation of green-houses less necessary, and would enable gardeners to manage the artificial climate of their hot-houses with less difficulty. The fact that cellular plants grow best under this mode of treatment, was well established.—In answer to a question from Professor Lindley, Mr. Gray and Mr. Yates stated, that plants had both flowered and fruited under this plan of treatment.†—Professor Graham stated that the order in which he had found plants to grow best, was, 1. Lycopodiums; 2. Grasses; and 3. Begonias.

Mr. Pooley then made some remarks on some swallows he had found embedded in ice in Germany, There were three of them in the ice; two were destroyed in extracting them, but a third recovered and lived some hours. From this fact he was led to bring forward the subject of the hybernation of birds.

Mr. Duncan observed, that this question had been lately discussed in a periodical publication. Physiologically it appeared impossible for an animal so high in the scale of creation as a swallow, to undergo the process of hybernation, and Dr. William Hunter had stated it to be impossible: yet, still there were an immense number of facts, that rendered the hybernation of higher animals a possible thing.—Mr. Selby said, that whatever might be thought of the occasional hybernation of these animals, he believed it could not be generally so, for these birds depart from our shores in a young state, and come back after having undergone the process of moulting, which could not take place if they hybernated.—Mr. Allis observed, that from the structure of the heart of the bird, it was impossible that it should remain motionless for a lengthened period without cessation of life. The swallow too was a bird with a heart larger than ordinary.—Professor Rymer Jones was inclined to consider the circumstance related as entirely accidental.

Mr. Gould exhibited several drawings of birds, and proceeded to make some remarks on the family Trogonidæ. This family, he stated, might be regarded as strictly tropical, and by far the greater number of species inhabited South America; none of those inhabiting Asia and Africa having any specific relation with those of America. It is a remarkably isolated group, no *direct* affinity with other forms having been discovered. In organization and economy they are perhaps nearest the Caprimulgidæ. They inhabit the most retired and gloomy forests, remaining secluded during the day, and appearing at night; evening and morning being the only time in which they take their prey. They usually feed on insects, capturing them during flight, but sometimes they feed on berries. They incubate in the holes of trees, and, like the majority of Fissirostral birds, produce white eggs. The tribe present among themselves but little difference of structure. There are, however, well marked divisions according to their geographical range. Mr. Swainson divides them into five minor groups, Trogon, Harpactes, Apaloderma, Temnurus, and Calurus. The species of bird that Mr. Gould presented before the Section belonged to the latter group, and he proposed to call it *Calurus Peruvianus*. This sub-genus comprises the most beautiful birds of the whole family, and perhaps in the creation; it contains five species, only one of which until lately had been characterized. The present species, although it has not the lengthened upper tail feathers of the *C. resplendens*, (which was exhibited), yet its relations to that species were sufficiently obvious. For this species he had been indebted to the researches of the indefatigable and scientific French traveller, M. D'Orbigny, who had recently returned from Peru.

The President had shot these birds, the Trogons, and his observations were in accordance with the description of Mr. Gould. They generally fed on insects; and he had observed chrysalides in their stomachs. He knew an instance of their living two months on boiled plaintains. The family Calurus, probably, most frequently fed on berries.—Mr. Vigors remarked on the necessity of not only knowing the structure and plumage of birds, but also their general economy, in order to arrange them in a proper manner. The kind of food this family, the Trogonidæ, partook of, would, in a great measure, determine their relations. They appeared to stand between the Scansorial and Fissirostral birds. Their feeding and colour brought them near to the latter group, but their powers of wing were not so great.

Mr. Bickersteth then presented some milk that had been obtained from the *Galactodendron utile*, the cow-tree of Humboldt.

The milk was handed round to the Members; it smelt sour, and if we may judge from the grimaces of those venturous naturalists who tasted it, it was not very palatable.—Dr. Traill stated, that he had obtained from the Caraccas the milk of a reputed species of Galactodendron, which kept sweet for six months. On examining this milk, he found little or no caoutchouc, but wax and resin, whilst the milk of the cow-tree of Humboldt afforded a large quantity of caoutchouc.

Mr. Sandbach introduced to the Section two new species of birds, from the collection in the Museum of the Royal Institution of Liverpool. The first was a species of Pyronites, from Mexico, which he proposed to call *P. superciliosus*, on account of the light blue band of feathers that extended from the base of the beak over the eye to the back of the head. The second bird was a new species of Titmouse, also from Mexico. He proposed for it the trivial name *Melanotus*.

Mr. Vigors expressed his pleasure, not only at seeing the accession of two new birds to those already known, but also that the gentleman who named them had thus auspiciously begun his career as a naturalist. He hoped that wherever the meetings of the Association were held, they would excite gentlemen to come forward and observe for themselves.—Sir William Jardine observed, that the first bird was interesting with regard to a former question, and pointed out the relations of the Trogonidæ. He was inclined to place it among Fissirostral birds. He did not think it belonged to the Motmots, but that it might be found to be a second species of Crypticus.

Mr. Forbes then read a paper, 'On some new and rare forms of British Animals and Plants.'

He first directed attention to two new Mollusca, of the order Nudibranchia. The first, allied to the *Doris pinnatifida* of Montagu, and, probably, forming with it a section of the genus Melibaca of Rang, though wanting the appendages of the head, described as generic characters by that author. The remarkable granular structure of the branchiæ was said to be beautifully shown in the species now described, and the animal cast off its branchiæ at will, on being irritated.

The other mollusk, which Mr. Forbes believed to be new, is allied to the *Doris longicornis* and *Doris cærulea* of Montagu, which animals form the genus Montagua of Fleming, but the new species is distinguished from those described by Montagu, by characters which are at least sub-generic; and to the section which it might represent, he would also refer the *Doris muricata* of Müller. Both these animals are from the Isle of Man, where they are found on the stems of corallines, in twenty fathoms' water. Their examination suggested the following queries, concerning the order Nudibranchia:—

1st, How far is the presence, absence, or number of eyes, to be regarded as generic or specific in this order?

2nd, The same question as regards the appendages to the mouth and head.

And 3rd, What is the cause of those remarkable vivid variations of colouring which are seen in the branchial organs of Montagua, and some other genera of that order?

He next exhibited to the Section a mutilated specimen (mutilated by the animal itself, in the manner of the Ophiuræ,) of the *Asterias rubens*, agreeing

† At the green-house in Mount Street, we observed that some Begonias and Malvas were in full blossom, and that several Ferns and Cannas were in fruit.

exactly with the characters of that species as detailed by Dr. Johnston, of Berwick, in the Magazine of Natural History. He exhibited this specimen in order to point out that the *Asterias spinosus* of Link and of British authors is not a synonym of *A. rubens*, as Dr. Johnston supposed, but a distinct and very different animal, being the *Asterias echinophora* of Chiagi, and to announce that a true specimen of this rare species had been taken on the coast of the Isle of Man, by Mr. Wallace, of the Douglas Museum. He then submitted to the notice of the Section specimens of the Polygala, of which he had given a description in the proceedings of the Botanical Society of Edinburgh, and which he believed to be a new and distinct species, more nearly allied to some of the continental species, such as *P. alpestris* and *P. austriaca*. Lastly, he laid on the table specimens of a remarkable form of Euphrasia, which he had lately found in great abundance in the Isle of Man, and which presents characters of a much more specific appearance than those presented by any of the numerous varieties of *Euphrasia officinalis*. The new plant is hairy all over; its calyx and capsule present distinctions sufficiently well marked, and its habit is very different from that of the common species. Mr. Forbes declined to give names, for the present, to the animals and plants which he had described, preferring to receive the judgment of naturalists upon them, ere he ran the risk of creating a useless synonym. He also suggested, as an object worthy the attention of the Association, that a complete list of the British invertebrate animals should be drawn up under its direction.

Professor Graham observed, with regard to the species of Polygala and Euphrasia, suggested by Mr. Forbes, that he was inclined to doubt the propriety of admitting them. No genera varied so much, or were so tantalizing to the botanist, as those above mentioned. He had to inform the Section of some new plants added to the Scotch Flora, by Dr. M'Nab. 1st. A species of Arenaria, new to the British Flora. 2nd. *Lathyrus pisifolius*. 3rd. *Cochlearia Anglica*. He stated that *Cladium mariscus* was a good instance of the caution with which we ought to reject the testimony of good naturalists, who state that they had found species in certain places, when they are afterwards not met with. This plant, originally found in Galloway, could not afterwards be discovered; and as it was common in Galway, in Ireland, it was hastily concluded that a mistake had been made between the two names. He (Prof. Graham) was, however, now able to state that it had been recently rediscovered in Galloway.—Some observations were then made by Messrs. Babington, Nevan, Forbes, and M'Kay, on the relations of locality to the varied forms of plants; and on the claims of Mr. Forbes's Polygala and Euphrasia, and Professor Graham's Arenaria, to be considered as distinct species.

Section E.—ANATOMY AND MEDICINE.

WEDNESDAY.

The first paper read was by Dr. Macintosh, 'On Dysmenorrhœa.'—The medical importance of this communication was very generally admitted, and no doubt a full report will appear in the medical reviews; but even an abstract could not, with propriety, be given in a journal intended for general circulation.

Sir James Murray then read a paper, in continuation of a former one, published in the *Dublin Medical Journal* for July, 1836. His object was to show, that a great variety of disordered conditions of the nerves, and of the vital organs, result from the presence of urinary secretions in the circulating fluids. In two cases of fatal neuralgia, one tic douloureux of the thumb, he found the investments of the nerves studded with microscopic crystals. The crystals had the same constituents as those sometimes observed in the sediments of urine. Crystalline frost-work has been lately observed in the heart, brain, and other organs, by Mr. George, and in the membranes of the bowels by Professors Harrison, Apjohn, and others. Great constitutional and local irritation, he considers, is sometimes created by the acrimony of saline solutions remaining in the solids and fluids of the body; and, as these extraneous substances do not amount to tangible particles and concretions, that the presence of unsaturated alkaline or acid reagents, maintain many obstinate disorders—as hysteria, some kinds of asthma, indigestion, &c. He had detected uric acid, urea, and many other excretory substances in obstinate sores, in discharges from the eyes, in the incrustations of *Tinea capitis* and *Lepra*. He also thought the tubercles deposited in the lungs, and composed of the substance called soluble extractive, animal matter of a similar kind. When this matter meets oxygen in the lungs, it is deposited in a solid state of various consistency. The various oxides it meets with in other parts of the body, render it insoluble, and it is found imbedded in many other parts, but not so frequently as in the lungs. The elements of these extraneous matters are not always separated by the kidneys, and untoward chemical combinations are frequently set up by the presence of acid or exciting atoms not duly excreted from the fluids.

He proposed to neutralize or precipitate these impregnations by baths, acid or alkaline, as were required, and to try to obtain precipitates in the urine similar to those which pass off in the crises of fevers and acute rheumatism. Sir James concluded by lamenting, that the ridicule thrown upon such examinations by the mystical and pretended diagnoses of charlatans, had deterred medical men from examining the secretions with sufficient precision; but hoped that the difficulty of this inquiry would no longer retard the investigations of such prominent signs and causes of disease.

Dr. James Johnson said, that the examinations recommended by Sir J. Murray were becoming more and more common. He could not attribute the state of the body impregnated with the kinds of salts described in the paper, to the cause assigned by Sir James Murray. The cause, in his opinion, was rather a defect of action in the kidney, than absorption—not but that absorption and re-absorption of urea and uric acid would take place as described.

The Secretary then read a paper by Dr. Madden, communicated by Professor Alison, being, 'Experiments on the connexion between Nerves and Muscles.' The author began by stating, that two different opinions on the subject of his paper were entertained—the one by Dr. Whytt, and the school of neuralogists who attribute muscular motion to nerves and irritants, mechanical or chemical, which excite motions through nervous agency; and the other, that the power was inherent in the muscles themselves, the nerves being only conductors. He had been in consequence induced to institute a series of experiments; and he now detailed a great number on the nerves, muscles, and heart of frogs, by galvanism, mechanical irritations, by immersion, and application of narcotic solutions, and by the internal administration, or rather putting into the mouth, of prussic acid, carefully timing the progress. These were thought to bear out the following conclusion, at which the author arrived. When we see narcotics have, by no means, a destructive influence on irritability, nor on nervous trunks, no change on muscular fibre—when we see nerves cease to excite contractions *long before* muscles themselves have lost their irritability, their number and size bearing no proportion to irritability—when we see many muscles insensible to the irritation of nerves, and that a muscle with a divided nerve can recover its exhausted irritation in so short a time, and so perfectly, we must withhold our confidence in neuralogy, and believe that muscular contractility is not dependent on nervous influence.

The Secretary then read a paper from Dr. O'Bryan Bellingham, 'On the order of the succession of the Motions of the Heart.' On performing some experiments on frogs, his attention was directed to the order of the progressive motions of the heart, which was in opposition to that given by Dr. Hope, and the one usually received, which is the following:—

1st. motion the auricular systole.
2nd. — ventricular, with impulse, and no pulse.
3rd. — ventricular diastole.
4th. — interval of ventricular repose, towards the termination of which auricular systole takes place.

While the experiments and observations of Dr. Bellingham showed the following:—

1st. was the auricular systole.
2nd. — ventricular diastole and impulse.
3rd. — ventricular systole.
4th. — interval of ventricular repose towards the termination—auricular systole.

He found, that in duration of time the diastole of the ventricles occupies double the time of the systole, and the interval of repose equalled nearly the time taken up in the systole.

With respect to the sounds, he found the

1st. synchronous with ventricular diastole.
2nd. — ventricular systole.

Dr. Williams said these experiments had been described long ago. They were formerly supported by Dr. Corrigan, who had publicly abandoned them. They were true as to frogs, but *not* of warm-blooded animals—they were not true in the human subject, and the analogy which the author implied between the progressive motions of the heart of frogs and man was utterly impossible.

The next paper was entitled, 'Observations on the disease called Cocobâe by the Africans, or Arabian Leprosy, the Ara-apatta of the Caribes of Guiana, the Radesyge of Northern Europe; and on the Methods found most effectual in the treatment,' by Dr. John Hancock.—Dr. Hancock considered that Lepra Arabum, Cocobâe of the Africans, Ara-apatta of the Caribes of Guiana, as identical, and to consist in a vitiated state of the blood and serous fluids, with obstruction of the absorbing and secerning vessels, with a peculiar diathesis, forming under the skin tubercles, knobs, and indurations, which characterize the disease. The progress being slow, the humour solidifies almost as fast as it transudes. Dr. Hancock had never known this disease to be communicated by husband to wife, or *vice versâ*. This, with many other circumstances, induced him to believe that the disease was not contagious. The disease, in its early stage, is curable, though considered to be incurable: the unhappy subject is regarded with suspicion; and when the disease is fully established, the sufferer is obliged to be sent to some retired part of the colony. Bathing, salines, and anodynes, were recommended. The Indians, especially the aborigines of Guiana, resort to fomentations, baths, and a drink of the bark of a tree called Mouca, with the root of a vine, Paramaroora, a species of *Cissus*, and the bark of Waiacano (guiacum), the infusion of which is fermented with honey. They use, also, the bark of the tree "tamootu," a nondescript.

We now give our promised abstract of the Report read on Tuesday, by Dr. Black, on the Epidemic Influenza, as it occurred at Bolton-le-Moors, in January, February, and March of this year, and which principally referred to the Meteorology of the season, and to the question how far the Epidemic bore upon vital Statistics and Mortality.

After a summary of the principal pathognomonic symptoms which characterize the disease in its more severe and fatal forms, with a short notice of *post mortem* investigations, and the treatment generally adopted, Dr. Black proceeded to say, that to the medical philosopher, the extent and intensity with which the epidemic bore upon the population of the country, along with the ratio of mortality which marked its progress, as well as the meteorological state of the weather, which preceded and accompanied its march over the kingdom, were subjects of great, and of historical interest, especially when compared with the nature and progress of former epidemics of th kind, and with the rise, abode, and intensity, in othe places, of the same epidemic. For the purpose of elucidating these important and relative matters under which the disease appeared and prevailed at Bolton, he obtained a correct register of the weather in its principal meteorological conditions, for the months of January, February, and March of this year, during which the epidemic appeared, prevailed and decayed at that place, to which he had added a column exhibiting a scale of the epidemic's rise, maximum intensity, and decay. This column was constructed from the several lists of cases of influenza entered and kept by three of the principal practitioners of the place and himself; which entries for each day being added together, gave a ratio corresponding to 100 as the maximum intensity on the 3rd February. To this table he also added a Mortality Register of 420 burials, and therein stated the several ages and quinquennial periods, at which the individuals died, after the fifth year, with the different amounts and ratios for the late epidemic season as well as for the average of the same months during the five previous years. [*See Tables, next page.*]

A METEOROLOGICAL REGISTER

FOR

JANUARY, FEBRUARY, AND MARCH, 1837,

With a Nosometrical View of the Epidemic Influenza during the same Months, as observed at Bolton-le-Moors.

1837. JAN.	Mean of Morning, Noon, and Night. Therm.	Barom.	At Noon. Dew Point.	Evaporation.	Fall of Rain.	WEATHER.	Nosometrical Scale of Epidemic Influenza. Maxm. Intensity = 100
1	30°.3	30.27	30°	. .	. .	Fair all day	
2	32. 3	30.12	31	. .	. .	Very foggy	.1
3	40	30.02	38	. .	. .	A little rain A.M. and P.M.	
4	38. 3	30.02	39	. .	. .	Fair	
5	36	29.62	35	. .	. .	Fair	
6	39. 3	29.19	38	. .	. .	Rain all day, some hail P.M.	.5
7	38. 3	29.37	38	. .	. .	Rain and a little hail A.M. and P.M.	
8	38. 7	29.82	35	. .	. .	Rain at night	
9	47. 3	29.68	46	. .	. .	A little rain A.M.	1
10	37. 3	29.62	38	. .	. .	Fair	
11	27. 7	29.89	27	. .	. .	Fair	1.5
12	34. 3	29.47	28	. .	. .	Snow A.M.—snow and rain P.M.	
13	40. 7	29.17	38	in	in	Rain in the morning	2
14	33. 7	29.94	32	16	16	Fair	2.3
15	34	30.15	30	days	days	Fair	3.4
16	38. 7	30.05	37	0.15 in.	2.44 in.	Very foggy P.M.	4.6
17	40	29.98	38	. .	. .	Fair	9.1
18	38	29.82	35	. .	. .	Fair	14
19	37. 7	29.64	35	. .	. .	Fair	18
20	35	29.46	32	. .	. .	Fair	25
21	37	29.25	33	. .	. .	Rain at night	30
22	44	28.94	43	. .	. .	Rain all day	40
23	45. 3	29.02	43	. .	. .	Rain all day	42
24	41. 7	29.30	41	. .	. .	Rain A.M.	50
25	41	29.45	40	. .	. .	Rain all day	56
26	39. 3	29.53	37	. .	. .	Fair	71
27	37	29.68	36	. .	. .	Rainy at night	75
28	33	29.73	33	in	in	Snow at night, and a little A.M. and P.M.	80
29	32	29.57	30	15	15	Snow all day	90
30	36	29.48	34	days	days	Snow A.M.	92
31	41. 7	29.61	40	0.09 in.	1.10 in.	Rain P.M.	93
Max.	49°	30.31		Total	Total		
Min.	25°	28.88		0.24 in.	3.54 in.		
Mean	37°.5	29.638	35°				
FEB.							
1	41.°3	29.79	40°	. .	. .	Rain at night	95
2	43. 3	29.99	41	. .	. .	Fair all day	98
3	41. 3	30.03	40	. .	. .	Rain all day	100
4	41	30.07	40	. .	. .	Fair all day	90
5	37. 7	30.01	36	. .	. .	Rainy A.M. and P.M.	82
6	41	29.98	37	. .	. .	Fair all day	71
7	41	29.88	39	. .	. .	Fair all day	60
8	43	29.80	41	. .	. .	Rain A.M. and P.M.	72
9	47	29.83	44	. .	. .	Some rain at night	91
10	49	29.34	50	. .	. .	Rain all day, stormy P.M.	69
11	43. 3	28.72	50	in	in	Rain & very stormy all day	62
12	39. 3	29.02	37	14	14	Rain morning and night	60
13	44	28.82	44	days	days	Rain A.M.	55
14	41	29.21	40	0.27 in.	2.15 in.	Fair all day	50
15	43. 3	29.62	41	. .	. .	Rainy P.M.	44
16	52	29.65	50	. .	. .	Fair all day, stormy at night	37
17	44. 3	29.90	44	. .	. .	Fair all day	36
18	41. 3	29.44	44	. .	. .	Rain P.M., rain and hail at night	30
19	38. 3	28.95	38	. .	. .	Rain and a little snow all day, boisterous, P.M.	23
20	42	29.19	42	. .	. .	Rain at night	21
21	41. 3	29.19	41	. .	. .	Rain at night and P.M.	14
22	41	29.51	39	. .	. .	Rain A.M., rain and snow, P.M.	9.1
23	39	29.02	43	. .	. .	Rain, hail, and snow, very stormy P.M. and night	8
24	39	29.64	40	. .	. .	Fair all day but boisterous	7
25	35. 3	29.95	35	in	in	Fair all day	6
26	33. 7	29.90	30	14	14	A little snow P.M.	7
27	39. 3	29.74	40	days	days	Rain at night	4.6
28	38	29.95	40	0.54 in.	2.25 in.	A little rain P.M.	4
Max.	56°	30.10		Total	Total		
Min.	30°	28.60		0.81 in.	4.40 in.		
Mean	41.°4	29.57	40°.9				

MARCH.	Mean of Morning, Noon, and Night. Therm.	Barom.	At Noon. Dew Point.	Evaporation.	Fall of Rain.	WEATHER.	Nosometrical Scale of Epidemic Influenza. Maxm. Intensity = 100
1	34°	30.19	32°	. .	. .	Fair all day	3.4
2	37. 7	30.10	32	. .	. .	A little rain P.M. & at night	3.5
3	40	30.08	41	. .	. .	Slight rain A.M. and P.M.	4.6
4	39	29.95	39	. .	. .	Fair all day	4.
5	37. 3	29.71	39	. .	. .	Slight rain A.M. and P.M.	3.5
6	39. 3	29.77	37	. .	. .	Fair all day	3
7	40	29.85	37	. .	. .	Ditto	2.3
8	42	29.83	38	. .	. .	Fair all day—but strong wind P.M. and night	2.2
9	45	29.57	39	. .	. .	Slight rain P.M. and night	2
10	41. 7	29.00	40	. .	. .	Rain P.M. and stormy	1.2
11	36	28.95	34	. .	. .	Snow and rain P.M.	
12	36. 3	29.23	35	in	in	Rain and snow at night	
13	36. 3	29.85	38	15	15	Snow A.M.	1
14	37	30.17	32	days	days	Fair all day	
15	37	29.99	33	0.38 in.	0.20 in.	Ditto	1.2
16	40. 3	29.92	36	. .	. .	Ditto	
17	41. 7	30.08	38	. .	. .	Ditto	
18	37. 7	30.02	37	. .	. .	Slight sleet at night	
19	37. 3	29.85	33	. .	. .	A little snow A.M.	
20	35	29.78	38	. .	. .	Snow all day	1.3
21	37. 3	29.55	32	. .	. .	Slight snow the whole 24 hours	
22	32. 7	29.50	32	. .	. .	Slt. snow P.M. & at night	1.
23	32. 7	29.47	34	. .	. .	Ditto, the whole 24 hours	
24	34	29.54	35	. .	. .	Much snow in the morning	
25	36	29.46	35	. .	. .	Slt. rain & snow at night	.8
26	34	29.52	34	. .	. .	Slight snow and hail P.M.	.5
27	32. 3	29.66	30	. .	. .	Ditto all day	
28	36	29.47	34	in	in	Heavy fall of snow A.M.—snow P.M.	
29	37. 7	29.36	36	16	16	Snow A.M.—hail at night	.1
30	36. 7	29.57	36	days	days	Fair all day	
31	36. 7	29.64	34	0.25 in.	1.21 in.	A little snow early in the morning	
Max.	51°	30.20		Total	Total		
Min.	26°	28.90		0.63 in.	1.41 in.		
Mean	37·°3	29.697	35°.5				

REGISTER of 420 BURIALS at the Parish Church, BOLTON,

In January, February, and March, 1837, with the average Amount of Burials during the same Months of the five previous Years, and the ratio per cent. buried at the several Ages, to the total Deaths in the two Periods.

AGE.	1837. JAN.	FEB.	MARCH.	Total burials for the 3 months.	Ratio per cent. at the several ages to the total Burials for the 3 months.	Average Burials during the same months in the five previous years.	Ratio per cent. at the several ages to the total Burials in the same months of the 5 former years.
Under 1 year	21	50	21	92	21.9	76.6	26. 6
1	11	24	7	42	10.	39.8	13. 8
2	10	8	2	20	4.8	18.2	6. 3
3	1	8	2	11	2.6	8.6	3.
4	3	1	3	7	1.7	9.4	3.24
5 — 9	3	3	4	10	2.4	18.	6.27
10 — 14	5	8	4	17	4.	7.	2.43
15 — 19	4	4	1	9	2.1	6.8	2.36
20 — 24	2	5	6	13	3.	10.2	3.54
25 — 29	2	6	2	10	2.4	9.4	3.26
30 — 34	7	10	1	18	4.3	6.8	2.36
35 — 39	1	5	5	11	2.6	7.	2.43
40 — 44	6	7	3	16	4.	6.8	2.36
45 — 49	8	11	7	26	6.2	7.8	2. 7
50 — 54	7	9	3	19	4.5	6.	2.
55 — 59	1	9	3	13	3.	7.8	2. 7
60 — 64	2	11	6	19	4.5	11.4	4.
65 — 69	10	11	6	27	6.4	8.6	3.
70 — 74	2	8	9	19	4.5	11.4	4.
75 — 79	5	3	2	10	2.4	4.8	1.66
80 — 84	3	4	2	9	2.	4.	1. 4
85 — 89	—	—	—	—	—	2.4	.83
90 — 94	—	—	—	—	—	.6	.2
95	1	—	—	1	.24	.2	.07
100	—	—	1	1	.24		
TOTAL.	115	205	100	420			
Total average for the five previous years.	111.2	79	97.8			288	

From the register of the weather it is seen, that during the first two weeks of January, the temperature was very irregular, varying in the mean of morning, noon, and night from 47°.3 to 27°.3, while the barometer was gradually falling from 30.27 to 29.17, and snow, hail, rain, and fair weather prevailed by turns. The epidemic, during this period, had scarcely made its appearance, and except it had subsequently done so, the few cases of suffocative catarrh and atonic bronchitis would have been attributed to an endemic and sporadic origin. With the 14th day of the month commenced a week of fair weather, and of a steadier and milder temperature; but after a very sudden rise, a declining state of the mercurial column took place, which reached its lowest depression of 28.88 on the evening of the 21st, while the dew point became nearer to the mean temperature. Contemporaneous with this lowest state of the atmospheric pressure, on the 21st commenced the full and rapid invasion of the epidemic, similar to some mighty mortific wave, that was sweeping over the country, sudden in its attack, but more lingering on its departure. As the disease advanced, the temperature fell for seven days, with continued rain, or snow till the end of the month. The barometer on the whole gradually rose, until it attained 30.10 on the morning of the 4th of February. The previous day the epidemic had reached its maximum intensity, having, in the course of a fortnight, laid the whole population, with trifling exceptions, under its influence, which extended from the merest *malaise*, or slight catarrh, to the most deadly effect on the functions and organs of life. After this culminating point, it gradually diminished in the number of cases, though not in the severity of many individual instances; and many diseases occurred, even until March, which could be fairly attributed to the constitutional taint or diathesis, which the epidemic had produced. The invasion of the epidemic was preceded by and attended with easterly and southerly winds, while the atmosphere was much loaded with moisture. This high point of saturation may be frequently observed during the prevalence of the epidemic, for the dew point is, for several days, seen to be as high, if not higher, than the mean temperature of the day. This anomaly in part arises from the dew point being taken only once a day, at noon, while the temperature was not only taken at that hour, but at morning and night. The average of the three would therefore be sometimes below the dew point at noon.

In comparing the *mortality* of the five previous years, during the same months with that during the prevalence of the epidemic, it appeared, that the increase on the whole three months was equal to 45 per cent. on the average mortality, and for the month of February alone, it was 160 per cent. Of the 420 deaths, 205 were males and 215 females, while the ordinary sexual proportion of deaths is as 109 males to 100 females. The half nearly, 208 of the 420, were under twenty years of age; while the half of the deaths, during the five previous years, were under three years and ten months. 21.9 per cent. of the whole deaths enumerated during the epidemic took place under the age of twelve months; while the average at that age, during the same months of the five previous years, was 26.6 per cent. The same proportions are observed during the second year of life. These ratios in favour of early life, during the epidemic, continue until the thirtieth year, when it changes to the prejudice of adult life. For instance, between the years of forty-five and forty-nine, the ratio of deaths to the whole was 6.2 per cent.; while at the corresponding ages, in the five previous years, it was only 2.7 per cent.; nearly about the same disparity obtains at the quinquennial periods of sixty-five and sixty-nine, and through all the advanced years of life, compared to the ordinary rate of the mortality at those periods of life, during former years.

In corroboration of the great increase of mortality during the epidemic, and of the greater extent, to which it bore upon those in advanced life, Dr. B. brought forward several notices and reports that have been published since the epidemic, and especially those by Drs. Clendinning, Heberden, and Graves; and regretted that reports of the kind had not been more general, and more exact in all contemporaneous conditions of the atmosphere and of the locality affected, so that some deductions might have been made, as to the laws under which the epidemic appeared and marched over the kingdom. By observing the date of its appearance, and its culminating point at many places, the nosometrical lines might be traced over the map of a country, and even over the inhabited part of the globe itself.

Section F.—STATISTICS.

TUESDAY.

The Report of the Committee appointed to investigate the state of education in the city of York was the first paper read. It will soon be published by the Manchester Statistical Society; and such publication will contain portions, omitted in this report to the Section as being moral rather than statistical. The Committee began by adverting to the obstacles they encountered in endeavouring to procure accurate information, although there were many conductors of seminaries who cheerfully rendered all the aid in their power. The masters of endowed and charity schools, it was observed, answered all interrogatories with the utmost caution, and were exceedingly vague in their replies.

The population of the city of York, at the date of the inquiry, may be stated, in round numbers, at 28,000; of these

2298 or 7.96 per cent. attend Day or Evening Schools only.
2521 or 9.00 per cent. attend both Day and Sunday Schools.
842 or 3.01 per cent. attend Sunday Schools only.
Total School attendance 5591 or 19.97 per cent.

891 of these were under the age of five years; consequently 4.700 belong to the decennial period, which has been always made the basis of the Society's calculations. Taking the persons between the ages of five and fifteen as one-fourth of the entire population, it will appear that 67.0 per cent. are under process of nominal instruction, and 2,300, or 33.0 per cent. receiving no instruction whatever. Every successive inquiry demonstrates the extreme inaccuracy of the returns made to Government in 1833. Making full allowance for the schools established since that period, the net deficiency in the Government returns in the districts examined by the Manchester Statistical Society, was 53 schools and 1650 scholars.

The class of dame schools in York is superior in cleanliness and comfort to those in the crowded mercantile towns previously examined by the Society—none were in cellars, none in garrets—only one was in a sleeping-room, and that was remarkably clean and airy. A large proportion of the children, however, are *do-nothings*, sent merely to be kept out of the way, at a charge of only 2*d.* per week. These schools are entirely destitute of proper books; some are without any—others have only mutilated fragments. The teachers are mostly poor women—four of them, indeed, were "actually receiving parochial relief." The common day-schools—twenty-three in number—are higher in pretensions, and better in condition than the preceding; still, however, two were used as dormitories, and two as kitchens. The Bible, or parts of it, is the general book from which the alphabet is learned, amid much flagellation and many tears. The usual terms are 4*d.* a-week for reading only, 6*d.* for reading and writing, and 7*d.* if arithmetic be added. The average remuneration which the teachers receive is 9*s.* 6*d.* per week in boys' schools, and 8*s.* in girls' schools. The education is scarcely ever effective: the system pursued is slovenly and mechanical. Superior private schools are numerous in York, and many boarders from other places coming to these seminaries swell the general result, and give a more favourable view of the state of education in York, as compared with other towns, than it deserves. The infant schools are scarcely so well conducted as in the other towns, which the Committee have examined. Two of them are connected with the Established Church, and one with the body of Wesleyan Methodists: they afford preliminary training to 416 children. Sunday-school teaching has been carried to a great extent; but it is now on the decline, in consequence of the facilities for education afforded by charity day-schools. There are thirty-one endowed and charity schools, containing 2281 scholars, which is nearly 41 per cent. of those under the process of instruction. The education given is of a superior kind; but many gross abuses appear to prevail in the management.

The gentleman who drew up the report, presented the following comparative table of the places examined by the Statistical Society of Manchester.

Per-centage of the Population who attend	200,000 Manchester.	50,000 Salford.	230,000 Liverpool.	20,000 Bury.	28,000 York.
Dame Schools . .	2.36	2.81	2.28	4.20	2.66
Comm. Day-Schools	3.40	3.30	2.65	4.04	1.96
Superior Private .	1.47	1.60	·1.77	0.87	2.56
Infant	0.32	0.68	0.96	1.42	1.48
Evening	0.73	0.96	0.24	0.75	0.15
Endowed & Charity	1.78	2.55	4.91	1.84	8.15
Total who attend					
Day-Schools . .	10.06	11.90	12.81	12.12	16.96
Sunday only . .	11.59	11.53	1.62	15.51	3.01
Total who attend any Schools . .	21.65	22.43	14.43	28.63	19.97

Two papers were then read, containing remarks on the Report of the State of Education in Liverpool, presented last year to the British Association. We published, at the time, a very full abstract of the important document here referred to, [No. 462, p. 635,]—and when our paper reached Liverpool, it created, we find, a great excitement, which has not even yet subsided. The Mayor and several members of the Town Council came into the Section-room to take share in a discussion which was deemed necessary to vindicate the character of the town. As the publication of the Report, in the *Athenæum*, was specially referred to, as giving extensive circulation to what some considered an injurious report, we feel bound, in justice, to insert Mr. Merritt's remarks at full length:—

"At the annual meeting of this Association, last year, at Bristol, a report was read from a Committee of the Manchester Statistical Society, appointed to inquire into the state of education in the Borough of Liverpool. This report having been published in the *Athenæum*, a periodical of very extensive circulation wherever the English language is understood, and also in a separate pamphlet, excited very general attention, and not a little surprise. Liverpool having acquired some reputation, whether justly or unjustly it is not my purpose to inquire, for a certain degree of intellectual superiority amongst commercial cities, the public were not a little astounded, and perhaps disappointed, at the degrading picture then exhibited of the progress of civilization amongst our lower population. The report itself being, however, as I conceive, in some essential points, mistaken in its principle, and erroneous in its facts, I beg permission to offer a few remarks on this very interesting subject.

"The report assumes the population of the Borough of Liverpool to be 230,000, which is a considerable exaggeration. The census of 1831 makes the population of the Borough 165,221; and, calculating from the ratio of increase during the last decennial lustrum, the population, in 1835, could not be more than 185,000 for the ancient borough, and 220,000 for the new.

"The report proceeds to state, that one-fourth of the population, or 57,500, may be reckoned to consist of children between the ages of five and fifteen; and this number, it assumes, ought to be under the process of education. It appears, however, from actual examination, that only 27,200 are really under this process; and that therefore 30,300, or more than half of the whole, attend no schools whatever. This is the general and most deplorable result, which is held forth to the public as the state of education in Liverpool. Any attempt to reduce this sweeping conclusion to its veritable dimensions, must be allowed to deserve attention.

"In the first place, the population of the Borough being taken at 185,000, and not 230,000, one-fourth of the number to be educated, according to the principle assumed in the report, is not 57,500 but 46,250; but if the larger number be taken, it will be 55,000; and to avoid all future cavils or objections, we will take it at that number.

"2. The report takes for granted, that the children between five and fifteen constitute one-fourth of the whole population. Now, if we admit, with some late statistical writers, that one-half of the British population consists of persons of twenty years of age and under, it will, by no means, follow, that persons between the ages of five and fifteen consti-

tute the half of this moiety. The Economical writers of half a century ago, such as Sir John Sinclair, Dr. Price, and others, calculated, that one-half of the human race died before the age of five. From the improved value of human life, which has lately become manifest, we may raise this estimate to the age of six. Now, if one-half of the population perish before reaching the age of six, it is plain that the individuals of that age, existing at any given period, must comprise much more than the apparent numerical proportion of six to twenty; probably one-third of the whole. When this is considered, we cannot, in any fairness, reckon the children between the ages of five and fifteen at more than 48,000, instead of 57,500.

"3. Mr. Lowe, Dr. Colquhoun, and some others have assumed, that if one-eighth of the population of a country is under the process of education, the advance of knowledge in that country may be considered as satisfactory; but that proportion, according to the views now very generally, and indeed justly, prevalent, is, by no means, sufficient. The French statisticians, however, have not generally raised it to more than one-seventh. The Prussian writers on education, many of them eminent for their knowledge and learning, but mostly very sanguine in their views of the perfectibility of human nature, concur generally that one-sixth is not too high a proportion. I am told that some gentlemen of the House of Representatives, in the United States, have even advanced it to one-fifth; but this is evidently chimerical. Taking every circumstance into consideration, I think we cannot, in this busy country, where the struggle for existence is frequently so severe, and where there is, at once, more affluence and more misery than in any other civilized nation, expect to have a greater portion of our people under the process of education than about two-thirteenths, or something between one-sixth and one-seventh—we will, however, say one-sixth. On this principle we have a right to expect, that a number not less than 36,660 children should possess the permanent means of a competent education; yet the Manchester statement assumes, most preposterously, that not less than 57,500, or one-fourth of the whole population, should be in possession of those means. The report, however, does not state whether the ancient borough, or the Parliamentary borough, which comprises all the suburban villages, is meant. Even, in the latter case, the population is overrated. The Parliamentary return of the population amounted, in 1831, to 203,572.

"4. The report admits, that, from actual enumeration, there is really 27,200 children—(it is subsequently admitted, that 33,183 children are really receiving *some sort* of education)—that are receiving some sort of instruction in schools, and 30,300, or more than one half of the whole attend no school whatever. Now, it appears from the above statement, that if from the number which ought to be under the process of education, or 36,600, or deduct 27,200 which are actually under tuition, there will remain no more than 9,460, who are really destitute of all education; and this amount,—or in even numbers, say 10,000—is very nearly what myself and others, with whom I have communicated, would have conjectured from a general and careful survey of the state of our population. From this number, however, is to be deducted all the children educated in schools at a distance, which greatly exceed, in amount, the non-inhabitants educated here, all privately instructed, a considerable class, together with some smaller portions, which altogether cannot be reckoned at less than 1500, leaving a remainder of about 8,500 wholly without any sort of instruction.

"5. We come next to examine the character or quality of this instruction; and here, it must be admitted, there is quite sufficient, without the aid of any exaggerated or highly coloured statements, to awaken a sense of shame as well as of regret; but even here, I must contend, a picture is exhibited to the mind of the reader calculated to leave impressions far beyond what is warranted by the facts of the case. The truth of this assertion I hope to make apparent by the following short analysis:—

"At the anniversary assembly of the Church of England Charity Schools in June last, the number of children that actually attended divine service on that occasion was 8695; if to this we add 7½ per cent. for illness and other causes of absence, (which is a fair allowance,) we shall make the whole number of these pupils 9347. From personal inspection, as well as from the reports of persons on whom reliance is to be placed, I can take upon myself to affirm, that, according to the state of education in this country, almost the whole of these children are exceedingly well instructed in such branches of education as are supposed suitable to their condition in life. In one of these schools particularly, the Blue Coat Hospital, there is the most perfect exemplification of the capabilities of the Madras system which I have anywhere witnessed.

"With respect to the children educated at the various dissenting charity schools in Liverpool, I am sorry that I have not been able to obtain the same exact enumeration; but an approximation to the truth will be sufficient for our present purpose. It has been often affirmed, that the entire mass of dissenters in this town, (including the Roman Catholics,) is at least equal to that of the Church of England. I should suspect it to be considerably greater. It is well known, that, till of late years, the zeal for education amongst most of these various sects, greatly exceeded that of the Established Church. It has accordingly been sometimes asserted, though generally contradicted, that these schools of gratuitous instruction equal those of the Establishment, both in number and character. I doubt not that great deductions are to be made from this estimate, yet, I think, from the best information I have been able to collect, that we may at least assume 6500 as the number of children instructed in the charity schools of the dissenters. In most of them, I have also reason to believe that they are respectably taught, according to the prevalent notions respecting that grade of tuition.

"We are next to consider that large class of schools to which the character of respectability, in a greater or lesser degree, is generally applied; and to which, at least, none of the degrading characteristics exhibited in the Manchester Report can be suspected to have any reference. It is fortunate, that the valuable classifications of the last population census, afford us the means of making calculations on this subject with tolerable accuracy. From these documents, we gather, that more than eleven-sixteenths, or nearly three-fourths of the entire British population, earn their bread by manual labour. The remainder, consisting chiefly of gentry, clergy, professional persons, merchants and traders, may be safely estimated, in Liverpool, at 57,200, reckoned from the Manchester statement. According to that statement, which assumes that one-fourth of the whole population ought to be under the process of education, we might take it for granted, that 14,300 of this number are to be found in the upper class of our schools; but it would be unjustifiable to argue on data so evidently unfounded. Considering, however, that the passion for education has of late years become ardent and universal amongst all who possess in a moderate degree, the adequate means, we may safely assume, that at the better order of schools and seminaries one-fifth of this class is constantly to be found. From the postulates of the report itself, we might reckon on a much greater number, but we will take it at one-fifth, or 11,440. Adding together these three amounts, viz. 9357 taught in the schools of the Established Church; 6500 in those of the dissenters, and 11,440 in the better order of private seminaries, we have a total of 27,287, that are confessedly in the progress of a respectable education, according to the notions and practice prevalent, in this age and country. Deducting this from 33,183, which, by the Manchester report, is the number now ascertained to be actually receiving some kind of education in Liverpool, we have a remainder of 5896. It is to this number alone, that the disgusting details and humiliating descriptions of the Manchester report can be any way applicable; and what we have to complain of is, that this document is calculated to leave an impression, that this degrading picture is not the exception, but the rule, in a fair statement of Liverpool statistics. The first conclusion to which, the Committee state, these inquiries have led them, is, that more than one-half of the whole number of children in the Borough are actually receiving no sort of education in schools, either really or nominally: a conclusion so erroneous in its principles, and so exaggerated in its facts, that we are bound, for the honour of the town, to try to set ourselves right in public estimation. Still, it must be confessed, after all, that there is enough of truth in this report, to awaken the most vivid sentiments of regret in the mind of every inhabitant, and the most anxious wishes to see some speedy and effectual remedy applied to so monstrous and extensive an evil. Happily, we are now enabled to give to every candid stranger the assurance, that much has been done since the examination was made, to mitigate the evils complained of, and that a process of amelioration is in constant and accelerating progress."

Mr. Tate considered, that there ought to be a large reduction from the amount of population, on account of the fluctuating class of half-employed labourers and strangers, whose numbers he averaged at 30,000. He was also of opinion, that six, and not ten years, should have been the average for school age.

Mr. Gregg replied, that the Committee had calculated the number of children between five and fifteen from the population returns, and this estimate was confirmed from the calculations of Rickman and Cleland. So far were the members of the Manchester Statistical Society from the imputed intention of libelling Liverpool, that they had given a darker account of the state of education in their own town, in their published report. The reporters took the new, not the old Borough of Liverpool; Mr. Merritt had taken the latter, and had not allowed for the increase of population since the census. A decennial period was taken, merely for the purpose of comparison with towns already examined. He added, that the gentleman who impugned the report opposed guesses and estimates to calculation.

Lord Sandon arrived, and took the chair during the discussion, of which he availed himself to recommend the formation of a Statistical Society in Liverpool; an object likely to be accomplished, for the proposal was received with great enthusiasm.

Mr. Fripp then read a paper 'On the Educational Statistics of the parish of Siddlesham, in the county of Sussex,' by the Rev. F. De Soyres.

Population in census of 1831	1,002
Ditto at present	1,100

The schools are six in number.

Day-schools	3	with 93 scholars.
Dame	1	15 scholars.
Sunday	2	123 scholars.

40 attending Sunday schools also attend day-schools.

Adult Population.—Agricultural Class.

Able to read	males	55 married	28 unmarried.
	females	83 married	27 unmarried.
Not able to read	males	42 married	22 unmarried.
	females	30 married	1 unmarried.

Miscellaneous Class.

Able to read	males	38 married	16 unmarried.
	females	40 married	9 unmarried.
Not able to read	males	6 married	3 unmarried.
	females	6 married	2 unmarried.

It is observed, that many of those returned as able to read in the agricultural class, have been frequently very imperfectly instructed.

WEDNESDAY.

A Report of the Condition of the Working Classes in Manchester, Salford, Bury, Ashton, Dukinfield, and Staly Bridge. The inquiries were made by a Committee appointed by that truly active and useful body, the Statistical Society of Manchester. It occupied about seventeen months, in the years 1835-6, and cost the sum of 175*l.* The Committee's agents were almost uniformly well received; the only subjects, on which any disposition to mislead or resist inquiry was manifested, were those connected with the question of wages and the hours of labour.

It is to be regretted, that in the Manchester tables, the number of respectable houses which were not visited, was not registered. It will be seen that this deficiency is supplied in the Dukinfield district. The agents profess to have visited every house belonging to the working population; but the Committee felt less confident in the completeness and universality of the Manchester visitation than of the other districts. Those houses were reported as well furnished which contained a table and chairs, a clock, and chest of drawers, and a fair stock of necessary utensils. Those were considered comfortable which were clean, neatly arranged, and protected from the external air, even when somewhat bare of furniture. The first table contains the number and condition of the dwellings examined:—

CONDITION OF THE WORKING CLASSES IN THE BOROUGHS OF MANCHESTER, SALFORD, AND BURY.

Table No. 1.—Number and Condition of the Dwellings examined.

		Manchester.	Salford.	Total of Manchester & Salford.	Bury.
Number of Dwellings examined.	Houses	21,453	7,584	22,037	2,641
	Single Rooms	3,162	1,108	4,270	46
	Cellars	3,571	846	4,417	68
	Total	28,186	9,538	37,724	2,755
Condition of the Dwellings examined.	Total number of Dwellings well furnished	14,144	5,163	19,307	1,532
	Ditto tolerably furnished	....	....	....	415
	Ditto ill furnished	14,042	4,375	18,417	808
	Total	28,186	9,538	37,724	2,755
	Total number of Dwellings comfortable	19,864	7,417	27,281	1,608
	Ditto tolerably comfortable	....	....	....	369
	Ditto not comfortable	8,322	2,121	10,443	718
	Total	28,186	9,538	37,724	2,755
Estimated Population		200,000	55,000	255,000	20,000

It has been ascertained that, in Bury, the number of Beer Shops and Public Houses is about 117.

CONDITION OF THE WORKING CLASSES IN DUKINFIELD, STALY-BRIDGE, AND ASHTON.

Table No. 1.—Number and Condition of the Dwellings examined.

		Dukinfield.	Staly-bridge.	Ashton.	Total.
Number of Dwellings examined.	Houses	1,434	2,587	3,149	7,170
	Single Rooms	224	670	627	1,521
	Cellars	32	56	59	147
	Total number of Dwellings examined	1,690	3,313	3,835	8,838
Number of Houses of a superior class to those which formed the subject of this inquiry, and paying an annual rent which may be estimated at an average of 25*l.* to 30*l.*		59	209	628	896
	Total number of Dwellings of all kinds	1,749	3,522	4,463	9,734
Condition of the Dwellings examined.	Well furnished......comfortable	823	1,921	2,614	5,358
	Not well furnished comfortable	842	1,189	1,014	3,045
	Not well furnished not comfortable	25	203	207	435
	Total	1,690	3,312	3,835	8,838
	Total number of Dwellings comfortable	1,665	3,110	3,628	8,403
	Ditto ditto not comfortable	25	203	207	435
	Total	1,690	3,313	3,835	8,838
Estimated Population		8,600	17,200	22,000	47,800
Number of Licensed Victuallers		7	29	69	105
Number of Beer Houses		25	50	89	164

The proportion of beer-shops and public-houses to the population is, in Bury one to every 122 persons, Dukinfield one in 254, Staly-bridge one in 200, Ashton one in 213.

Table No. 2. shows the weekly rent of the houses inhabited by operatives. The general result is—

There are 28,186 Dwellings in Manchester, at an average weekly rent of 2*s.* 11¼*d.*
9,538 Ditto in Salford .. .. ditto .. .. 2*s.* 10*d.*
37,724 Ditto in Manchester and Salford, ditto .. .. 2*s.* 11*d.*
2,755 Ditto in Bury, at an average rent of .. .. 2*s.* 4*d.*

There are 1,690 Dwellings in Dukinfield, at an average weekly rent of 2.73*s.*
3,313 Ditto in Staly-bridge .. .. ditto .. of 2.56*s.*
3,835 Ditto in Ashton .. .. .. ditto .. of 2.53*s.*
8,838 Ditto .. .. ditto .. of 2.58*s.*

The third table shows the average size of families, and the numbers who reside in houses, rooms, and cellars.

Table No. 3.—Number of Families, and of Persons resident in the Dwellings examined.

	Manchester.	Salford.	Total of Manchester & Salford.	Bury.
Number of Families residing in the whole of the Dwellings examined	28,186	9,538	37,724	3,001
Residents in Houses:				
No. of Persons occupying Houses	94,250	31,693	125,943	—
Ditto occupying Rooms of Houses otherwise inhabited	9,351	3,132	12,483	—
Ditto boarding with the occupants of Houses	9,671	2,831	12,502	—
Residents in Cellars:				
No. of Persons occupying Cellars	14,274	3,310	17,584	—
Ditto boarding with the occupants of Cellars	686	25	711	—
Total number of Persons resident in the whole of the Dwellings examined	128,232	40,991	169,223	14,322
Average number of Persons to one Family	4.55	4.29	4.48	4.77

	Dukinfield.	Staly-bridge.	Ashton.	Total.
Total number of Families residing in the whole of the Dwellings examined	1,690	3,313	3,835	8,838
Persons resident in Houses:				
Persons occupying Houses	6,896	12,345	14,601	33,845
Ditto occupying Rooms of Houses otherwise inhabited	608	1,931	1,890	4,429
Ditto boarding with the occupants of Houses	507	1,288	1,226	3,021
Persons resident in Cellars:				
Persons occupying Cellars	134	235	217	586
Ditto boarding with the occupants of Cellars	1	....	....	1
Total number of Persons resident in the whole of the Dwellings examined	8,146	15,799	17,937	41,882
Average number of Persons to one Family	4.82	4.77	4.67	4.74

The cellars generally consist of two rooms; one of which serves as the sitting-room and dormitory, the other as the kitchen.

There is some vagueness in the division made in the third table between "children above twelve years of age" and grown-up persons. All were considered children who were unmarried and lived with their parents.

Table No. 4.—Number of Grown-up Persons and Children, and Number of Children receiving Wages.

		Manchester.	Salford.	Total of Manchester & Salford.	Bury.
Children	Number of Children under 12 years of age	40,170	12,529	53,690	4,984
	Ditto .. .. above 12 years of age	23,803	6,888	30,691	3,557
	Total Number of Children	63,973	20,417	84,390	8,541
Grown-up Persons		64,259	20,574	84,833	5,781
		128,232	40,991	169,223	14,322
Number of Children receiving Wages		24,277	5,991	30,268	3,631

		Dukinfield.	Staly-bridge.	Ashton.	Total.
Children	Number of Children under 12 years of age	2,586	4,577	5,756	12,919
	Ditto .. .. above 12 years of age	1,865	3,797	3,840	9,502
	Total number of Children	4,451	8,374	9,596	22,421
Grown-up Persons		3,695	7,425	8,341	19,461
		8,146	15,799	17,937	41,882
Number of Children receiving Wages		1,789	3,784	4,010	9,583

Table No. 5, containing the occupations, has little general interest, and is of suspicious accuracy.—Table No. 6 shows the professed religious denomination to which each family visited belonged. It is exceedingly interesting, and the Committee have reason to believe in its accuracy.

Table No. 6.—Religion as professed by the Heads of Families and Lodgers in the Dwellings examined.

	Heads of Families.		Lodgers.		Total of Manchester & Salford.	Heads of Families in Bury.	Lodgers in Bury.	Total in Bury.
	Manchester.	Salford.	Manchester.	Salford.				
Members of the Church of England	14,517	5,525	4,730	1,828	26,600	1,924	215	2,139
Protestant Dissenters..	7,240	1,963	2,416	442	12,061	893	72	965
Roman Catholics......	4,569	695	1,712	200	7,236	105	34	139
Jews	26	5	16	4	51	—	—	—
Making no Religious Profession	1,834	1,350	967	330	4,481	79	41	120
	28,186	9,538	9,841	2,864	50,429	3,001	362	3,363

	Dukinfield.		Staly-bridge.		Ashton.		Total.	
	Heads of Families.	Lodgers	Heads of Families.	Lodgers	Heads of Families.	Lodgers	Heads of Families.	Lodgers
Members of the Church of England	415	94	769	95	1,517	213	2,701	402
Protestant Dissenters..	545	99	917	169	624	139	2,086	407
Roman Catholics......	50	46	455	436	399	290	904	772
Jews	—	—	—	—	—	—	—	—
Making no Religious Profession	680	269	1,174	588	1,295	584	3,149	1,441
	1,690	508	3,315	1,288	3,835	1,226	8,840	3,022

The number ranged under the last division, "those making no religious profession," will doubtless astonish many. But among these were some who did not attend any place of religious worship, because they had not proper clothes, and others were men of serious demeanour, who simply declined to say to what sect they belonged, or whether they belonged to any.

Table No. 7 contains the country of the heads of families examined.

It is greatly to be regretted that the information contained in Table No. 8 did not engage the attention of the Committee until the Manchester inquiry was completed. A single glance at the table (given in the next page) will show that no portion of the domestic economy of the poor is more likely to influence their moral susceptibility.

Table No. 8.—Comparison, in each Family, of the Number of Individuals with the Number of Beds.

	Bury.
Families in which there are less than 2 persons to one bed	413
Ditto at least 2 persons but less than 3 to one bed	1,512
Ditto 3 ditto ditto 4 ditto	773
Ditto 4 ditto ditto 5 ditto	207
Ditto 5 ditto ditto 6 ditto	63
Ditto 6	15
Number of cases not ascertained	18
	3,001

Families in which there are	Dukinfield.	Stalybridge.	Ashton.	Total.
Less than 2 persons to one bed	401	789	628	1,821
At least 2 persons but less than 3 to one bed	773	1,434	1,228	3,735
At least 3 persons but less than 4 to ditto	372	796	889	2,057
At least 4 persons but less than 5 to ditto	109	201	322	632
At least 5 persons but less than 6 to ditto	22	69	89	180
At least 6 persons to ditto	6	23	54	83
Number of cases not ascertained	4	1	325	330
	1,690	3,313	3,835	8,838

In closing their Report, the Committee regret their inability to draw any general conclusions, until similar inquiries shall have been conducted in other parts of the country; and they earnestly hope that the publicity now given to this Report may stimulate others to follow out so valuable and interesting an investigation.

Before entering upon any discussion of this Report, it was deemed advisable that Mr. William Langton's Report on the Inhabited Courts and Cellars in the Borough of Liverpool, for the year 1836, should be read.

Table, showing the Number of Inhabited Courts, and the Number of Inhabited Cellars occupied as Dwellings in the Parish of Liverpool, 1835-6:—

Police Divisions.	Cellars	Courts
A. between the River and Vauxhall Road..	1,100	400
B. between Vauxhall and Scotland Roads..	1,660	571
C. between the New Market and the River	195	119
D. between the New Market and the Outskirts	865	205
E. central from the River to the Outskirts	463	156
F. from Duke Street to the Outskirts	423	60
G. from the Old Dock to Parliament Street, adjoining Toxteth	854	197
H. between Scotland and London Roads, to the Outskirts	941	256
	6,506	1,964

Census 1831 ..	Inhabited Houses	25,732
—	Population	165,175
Census 1836 ..	Probable Population ..	190,200

Table, showing the Number of Inhabited Houses, Cellars, and Courts, in those portions of the Out-townships included within the limits of the Parliamentary Borough of Liverpool, 1836:—

District.	Inhabited. Houses.	Cellars.	Courts.
Toxteth Park	3,838	874	251
West Derby	1,168	95	38
Everton	1,017	15	13
Kirkdale	341	3	5
	6,364	987	307

Probable amount of Population, 1836 39,800

REMARKS.

No courts have been counted which had not two or more families resident in them, and above one-third of the whole number contain six or more families. Few of these courts possess more than one outlet, and the streets off which they are situated are frequently very confined and filthy. Many inhabited cellars are found in these courts. Only such cellars as were occupied both for living and sleeping have been included in the tables. No account has been taken of cellars occupied as ginshops, and protected by the licence of the house above them. The great proportion of the inhabited cellars are dark, damp, confined, ill-ventilated, and dirty. The question occurs, what proportion do the occupants of cellars bear to the total population of the borough of Liverpool? Probably not less than one-seventh part of the whole number; for, supposing only one family to occupy each cellar, and each family to consist of five persons (the average of Liverpool in 1831), it would give a proportion of above 15 per cent.; while, by giving to each cellar only four occupants, we have about 30,000 persons inhabiting cellars out of a total population of 230,000.†

Mr. Corrie said, that the example given by the Manchester Statistical Society will be followed in Birmingham.—Mr. R. Greg observed, that one of the best means of raising the moral character of the poor would be, to get them to improve their dwellings.—Mr. Ashworth said, that this view was confirmed by experience in Bolton, where the improvement of the houses had led to an increase of delicacy of feeling and moral propriety.—Mr. Shuttleworth added, that, on the Duke of Norfolk's property, many of the operatives had become actual owners of their tenements, and that this had raised the character of the population, and improved the Duke's property.—Mr. Ashton stated he had only one turn-out of one week during thirty-seven years, which he attributed solely to the attention paid by himself and his partners to the domestic comforts and economy of his workmen.—A conversation followed on the possibility of having separate houses erected for the operatives; and it was generally agreed, that cottage comfort was one of the most beneficial objects to which public attention could be directed.

Mr. Slaney then made a Report on the Wages of Labourers in Manufacturing Districts. The improvement in the condition of the higher and middle classes, during the last century, is manifest: the increase of carriages, from 1820 to 1833, was one-fourth, armorial bearings one-third, and male servants one-third. With respect to those articles which indicate the condition of the comforts of the middle classes, the consumption of tea had increased 24 per cent., coffee 136 per cent.; stage coaches had doubled, and so had the consumption of textile fabrics. Taking the poor's rates as a test of the agricultural population, it was evident, that the condition of the peasantry had been greatly improved; and this view was further confirmed by the fact, that the deposits in savings banks had been greatly increased in the agricultural districts. The same test applied to the condition of the artificers, and shows progressive improvement; for the number of depositors, and amount of deposits in savings banks, had both increased one-third, while the increase of population was only one-eleventh. But, when we descend lower, to the class of unskilled artificers in large towns, we are led to conclude, that their condition has been deteriorated, from the decline of the deposits in savings banks, and from the decennial increase in crime, and the consumption of ardent spirits. The decennial increase of population in the five greatest of our manufacturing towns, averages 42 per cent., while the increase in the nation generally is only 11 per cent., and for London 20 per cent. Mr. Slaney dwelt on the importance of directing special attention to the state of this increasing and suffering population.

Mr. Felkin then read a Report on the Condition of the Manufacturing Classes in Nottingham, during the late period of commercial distress.—We had prepared a very full abstract of this paper, but the Section having resolved to have it printed, and subscribed for more than a thousand copies, we deem it better to wait for its appearance in print, and shall, therefore, confine ourselves to a notice of the general results. First, that the number of distressed applicants, from one of the highest-paid working classes in England,—the bobbin-net makers,—was as large as that from one of the lowest-paid classes, that is, the stocking-makers. Second, that the number of those who subscribed to sick clubs, &c. did not rise with the rate of wages. Thirdly, that the provision itself offered by such clubs was partial and unsatisfactory—partial, because not meeting trade fluctuations at all, and unsatisfactory, because many sick clubs are ill-managed, and held at public-houses, while some are yearly proved to be insolvent. Finally, that there was great improvidence in the class of artisans, which was generally highest in that which receives highest wages.

Mr. Felkin declared, that he was far from appearing as a calumniator of the operatives; he had sprung from them, and he lived by them; and he believed that he best proved his attachment to them, by showing the forms of improvidence which prevented them from advancing, as he had himself done, from the artisan's working-room to membership of the British Association.

At the conclusion of Mr. Felkin's Report, several gentlemen declared, that the circulation of the paper among the operatives would have the most beneficial effect. Col. Sykes and Lord Sandon expressed an anxious desire that it should appear also in the Transactions of the Statistical Society of London; and it was finally determined, that the publication should be immediate.

Section G.—MECHANICAL SCIENCE.

WEDNESDAY.

At the meeting of the Section the President intimated, that, for the future, all questions must be put through the chairman, and after the reading of each paper was concluded.—Mr. Russell then made some observations on certain circumstances in which engineers can alter the effect of tides in great rivers. The present view contemplated the tide as a wave, not as connected with currents; and it was his object to consider the manner in which the tidal wave may be modified, so as to reach an inland port sooner, in a greater quantity, and with less injury from tidal bores. It is requisite to distinguish the velocity of the tidal wave, and that of the current—that of the one being often greatest when the other is least. Observations on the Dee and the Clyde had shown, that the velocity of the tidal wave depended principally on the depth, and not on the breadth of the channel, being increased by an increase in the depth of the channel, and diminished by its increase in breadth. This tidal wave follows, as to its velocity, the same law as the great wave of resistance, mentioned in a former communication (see Monday's report, p. 677), and, like it, its progress was accelerated by vertical sides to the channel; so that, if in a rectangular channel, it moves twelve miles an hour, in a triangular channel it would move at but eight miles. Another point was with regard to the direction of the courses of rivers, and the effect of the bends in them; and it had been found, that it was possible to make the tidal wave move in a curve, round a projecting point, by a method the inverse of that in which a body may be made to move in a curve in a railway. This was effected by deepening the outside of the channel, compared with the inside, in a ratio according to the exterior curvature of a parabola, having its vertex in the centre of the curvature of the channel, and passing through the bottom of the inner edge of the channel. The advantage of these curves was this: that they would impede the water in flowing back, (an effect contrary to that obtained by straightening the channel,) and thus the tidal waters may be preserved for a long time. It had also been observed, that the tide might be made to rise higher, in any requisite degree, by altering the breadth of the channel, making it gradually narrow, from a wide mouth, with banks vertical and smooth. The tidal bore is a large wave, which, in some cases, has a head fifteen feet high, so as to swamp small-sized vessels. It is greatest near the banks, and smallest near the centre, and is principally found in rivers and places of rivers where the level of the bed is situated near the level of the mid tide. This wave changes its form as it approaches a shallow coast, the top being then accelerated, and breaks in a surge when it gets to water of less depth than itself. Supposing, then, that the tide has a bore three feet high, the water being three feet deep, by deepening the channel you remove the bore; and this is the only effectual remedy.

† [The following note was handed round the Section, when the reading of Mr. Langton's paper was concluded.] "In Bristol and Exeter (*probably* also in other similar towns), houses *formerly* occupied by merchants of the first rank, are *now* let out in single or double rooms, sometimes from 15 to 20 *families* in *one* house. One case, among others, I know, where *a man and his wife*, in such a house, pay 1*s.* 6*d.* a week for an unfurnished garret, and they let a *bed in it*, for 9*d.* per week, to a single man.—L. Carpenter."

Mr. W. West made some observations on the Ventilation of Tunnels. He had found, from various experiments under different circumstances in the tunnel on the Leeds and Selby Railway, that, even when the external atmosphere is as near to perfect stillness as is common in this climate, an atmospheric current passes through the tunnel, with sufficient rapidity to prevent the loss from hot air, or gain from cold, of more than a very few degrees; and this takes place almost entirely at the entrance, while, without rapid transmission, it would, of course, soon reach the mean temperature of the spot. Sometimes, however, the thermometer shows that the air which enters at the windward end passes up the nearest shaft, leaving the remainder of the tunnel worse ventilated than if no shaft existed. As the result of his experiments, Mr. West submitted, first, that the legislature and the public need apprehend no danger from the stagnation of air in railway tunnels, while they have abundant protection, in the enormous cost against any Company increasing, without occasion, their number or their length. Secondly, that it is at least doubtful whether open shafts do not rather impede, than promote, effectual ventilation from end to end.

Mr. Mushet made some observations on Railway Iron, founded on experiments carried on for forty years. He expressed himself much surprised, that hitherto, in contracts for iron for railway purposes, fibre and hardness were not stipulated for, but were left to the chapter of accidents. Both these qualities might be attained by his method, the principal characteristic of which consisted in doing away with the refining process now in general practice, and the preventing the severe decarbonization to which the iron was at present exposed. Several specimens of iron, of extremely fine fibre and hardness, were laid before the Section, and afterwards removed to the Model Room. The great object of his process was, to obviate the evil of lamination. On some railroads they had been obliged to lay the iron two or three times; but he had little doubt, that it would soon be possible to obtain a solid rail without any exfoliation.

Mr. Cottam mentioned, that he had known a piece of iron six inches thick, and considerably bent, to be quite straightened by blows, but, at the same time, to be greatly weakened; and that he attributed this to some of its constituent crystals being driven into it, by the force of the blows, like so many wedges, thereby weakening the strength of the iron.

Mr. Willis then addressed the Section, and gave a brief exposition of a new method for the formation of the Teeth of Wheels. The present practice was, that a wheel of seventy-two teeth was adapted to one of twenty; but this would not work with one of thirty-five. The method he now proposed would obviate this difficulty. It was founded on this principle, that if you take two pitch lines, and a tracing circle of any diameter, and if you trace an external epicycloid on the driver, and an internal one on the driven wheel, the two curves will move each other truly—it being necessary, however, in practice, to take a tracing circle of a radius equal to the radius of the smallest wheel of the set. The epicycloidal form, therefore, was decidedly preferable, as well from the accurate working of the teeth, as from the simplicity of the process, which was easily explainable to the workmen.—Mr. Willis mentioned, that Mr. Fairburn had furnished models made on the above principle, and that any pair would work together. —Mr. Willis then brought forward another form of teeth for cranes with heavy weights, with epicycloids in front and back involutes. These will only move in one way, but are not liable to slip.

Mr. Currie made one or two observations on what he termed a Safety Railway; and Dr. Lardner then addressed the Section on his old subject, which he had introduced on Tuesday—the application of Steam to long voyages. His remarks and calculations were, to a great extent, identical with those brought forward by him last year at Bristol, and published long since in his work on the Steam Engine, but the conclusions were somewhat varied; the Doctor did not now deny that the voyage might be practicable, but he did not believe that it would be profitable.—The comments on this address had somewhat more of novelty. Mr. Locke defended Hall's patent condenser. Mr. Cottam, in answer to Dr. Lardner's statement that the feathering paddle-wheels were better, but were three times as expensive as the others, and lasted only one-third of the time, mentioned, that he had some time since visited the *Firebrand*, after she had made two trips to Alexandria, and gone through very severe weather, and found her wheels, of the description referred to, so perfectly sound, that not even the oxide was off the joints: he did not believe such wheels to be either more expensive or weaker than others.—Mr. Rotch felt sure that Dr. Lardner's estimate of the speed attainable by steam-vessels was too low. For the *Dee* and *Medea* government vessels a rate was given of 8.3; but when the Doctor came to trading steamers, it rose to 9.9. What if it, in fact, were 15 miles an hour? The moment he turned to traders of the latest and best construction, up rose his maximum, and the London and Dundee steamers went far beyond it. Why too exclude the transatlantic steamers, the best of all? He had seen several gentlemen from America, and all agreed the voyage from New York to Albany was done at sixteen miles an hour.—Mr. Hawkins mentioned, that it was certain that the voyage up the Hudson was made at fifteen miles an hour, including several stoppages for passengers.—Mr. Guppy said, the Government steamers, from which Dr. Lardner had taken his calculations, were very unfavourable specimens. Even on the *Medea*, the best of them, as she was built in 1832, there might now be considerable improvements. The *Berenice*, for instance, built in Glasgow, of 230 horse power, had gone from Falmouth to Teneriffe at an average speed of nine miles an hour, consuming 14 cwt. of coals an hour, with $6\frac{3}{4}$ lb per horse power. From the *Atalanta*, of nearly the same horse power, nearly similar results had been obtained; and on one occasion, in a run of 2180 miles, she had made $8\frac{1}{10}$ miles an hour, consuming 11 cwt. of coal with 6 lb per horse power per hour, having, at the end of her voyage, 175 tons still on board. He mentioned, also, that there was a new vessel just built at Bristol, which is to have two engines of 200 horse power each, with $73\frac{1}{2}$-inch cylinders, cycloidal paddles, and four distinct boilers, so distant as to allow room to move between them. Now, taking the burden of this vessel at 1300 tons; her engines, boilers, and their water, would weigh 350 to 400 tons, which left 900 tons for coals and cargo. Reckoning the average consumption in the best steam-vessels, it would be found that her engines would not consume more than 30 tons a day,—so that, if necessary, she could carry coals enough for 30 days. If she were found to average 9 miles per hour, (and he hoped it would be nearer 10,) she ought to perform her voyage in 12, and, against disadvantageous winds, in 18 days. He was therefore sanguine that steam navigation across the Atlantic would be shortly established. Another vessel is now in process of building in London, of 1800 tons, with 78-inch cylinders. —Mr. Muir bore testimony, from personal experience, that the speed of the American steam-boats on the Hudson fully equalled fifteen miles an hour. One of them, the *Rochester*, had paddle-wheels above 30 feet in diameter, and made 23 strokes in a minute. Another, the *Novelty*, had made 29 and 31. The latter was 256 feet long, with large paddle-wheels, and narrow.—It was stated, in answer to a question from Mr. Russell, that in the Hudson, for 120 miles, there was no impediment to speed from the depth.—Mr. Hamilton (or Allan, we are not sure of the name), an American engineer, promised to transmit, *before the next Meeting of the Association*, a full report of the American steam-vessels, with every interesting particular connected with them.—Dr. Lardner replied that his objection to the condenser was not answered. It was not shown what the air pump could be used for, if the condenser converted the whole steam into water. He spoke of Morgan's paddle-wheels only from report and the assurance of engineers. He had no means of procuring from America, notwithstanding all his zeal, those authentic data on which only could he consent to found calculations. He had found extreme caution requisite—even nautical distances were so inaccurately stated, that he had to get them calculated specially by Captain Beaufort. He had not at all interfered with river navigation, nor was he satisfied with what he had heard. Those vessels were built for speed only. On the Hudson the boats were like canoes or Thames wherries, with the engines on deck. In an American sea voyage, 13 British miles was stated an average. This was 11 geographical miles, or a speed of 11 knots. He had told them the *Dundee* and *Perth*, he had been informed, made 10 within a decimal. One gentleman seemed to think 15 was nearer their rate. He would tell that gentleman what he did. He applied to Mr. Napier, who gave him the particulars of ten double voyages, and from that Mr. Napier himself deduced the rate of ten knots. He was not able to deduce exactly the consumption of fuel, but, in a loose way, he would say that it was not less than 10lb. per horse per hour, perhaps 12. Under these circumstances, he did not think they afforded a more favourable modulus, and therefore he used the *Medea*. His calculations were not founded on an average of steamers—old and new, good and bad—but on the *Medea*, and none else. He took her because she afforded the greatest average—most favourable to the project, and if any gentleman would put him in possession of a better, he would take it; but so long as he had not the precise facts he would not depart from her for ten thousand miles of Hudson voyages.

The President intimated, that Messrs. Curtis and Parr, of Manchester, had sent to the Section several specimens of their carding machines, and that they had kindly opened their manufactories to any of the members who might feel disposed to visit them.

Wednesday Evening Meeting at the Amphitheatre.—The building was crowded to excess, and as the great majority of the ladies were in full dress, the general effect was cheerful, and even brilliant. Mr. Snow Harris delivered his promised lecture on Atmospheric Electricity and the protection of Shipping from Lightning. The subject was most judiciously selected, as one of great importance to a commercial city like Liverpool; and the audience testified, by loud and frequent plaudits, the interest they took in it, and the admirable manner in which the arguments were illustrated and enforced by experiments. We do not report the lecture, because we are anxious to reserve all our space for the more novel, and, therefore, to the scientific world, more important business of the Sections. As we noticed some time since, (*ante*, p. 428), when Mr. Harris delivered the same lecture at the Royal Institution and the United Service Museum, the subject was brought under consideration, and fully examined by the same gentleman, in a series of papers in *The Nautical Magazine*, which can be immediately referred to by all specially interested.

MEETING OF THE GENERAL COMMITTEE.

THURSDAY.

The Committee having assembled for the purpose of determining where the next Meeting of the Association should be held, and for the appointment o officers, the President (Lord Burlington) called for the invitations addressed to the Association.

Invitations were then presented from the Mayor and Corporation, the Literary and Philosophical Society, the Natural History Society, the Antiquarian Society, the United Committees for the management of the coal trade on the rivers Tyne and Weir, and from a general meeting of the inhabitants of the town of Newcastle. This invitation was supported by letters from Sunderland and the University of Durham.—From the Town Council, the Governors of the Grammar School, the Philosophical and Botanical Societies, and other literary and scientific bodies of Birmingham:—and from the towns of Manchester, Sheffield, and Cheltenham.

After an amicable discussion it was resolved that the next meeting of the Association should, as announced last week in this Paper, be held in Newcastle-upon-Tyne; and the following noblemen and gentlemen were then chosen officers:—

The Duke of Northumberland, *President;* Earl of Durham, Rev. Vernon Harcourt, Prideaux John Selby, Esq., *Vice Presidents;* J. Adamson, Esq., Robert Hutton, Esq., Professor Johnstone, of Durham, *Secretaries;* Rev. W. Turner, Charles Bigge, Esq., *Treasurers.*

Mr. Lubbock, Professor Stevelly, Dr. Apjohn, and the Rev. Dr. Robinson, complained, without intending to be personal or disrespectful, that the Committee had gone to look for Presidents rather in Debrett's Peerage than among scientific records. A

short debate ensued, which ended without any expressed result, but which manifestly produced a strong feeling, that eminence in science, not personal rank, should for the future be the qualification for a President.

Professor Peacock was then elected as General Secretary in the room of the Rev. Vernon Harcourt; and the following gentlemen were appointed on the Council:—Mr. Baily, Prof. Christie, Prof. Graham, of London, Prof. Graham, of Edinburgh, Prof. Lloyd, Prof. Henslow, Prof. Baden Powell, Col. Sykes, Mr. Hutton, M.P., Mr. Greenough, Mr. J. Yates, Rev. F. Hope, Dr. Hodgkin, Dr. Roget, and Mr. M'Leay; and, as Auditors, Messrs. Hutton, Lubbock, and Porter.

The other officers were re-elected.

FRIDAY.—*Fête and Déjeuner at the Botanic Gardens.*—This fête, given by the resident members, was attended by a numerous company of visitors. A handsome breakfast was laid out in a marquee in the front of the conservatory, and a band of music was in attendance. The weather being fine, the whole entertainment went off remarkably well.

FRIDAY EVENING.—*General Meeting at the Amphitheatre.*—The sole purpose of this meeting was to hear the Reports of the Presidents of the several Sections on the business of the past week. As but little time could be allowed for this purpose, the Reports were necessarily, in a great degree, confined to an enumeration of the principal papers, with such comments as their merit and importance suggested; and as we have or shall report fully as to the nature and contents of these papers, and must economize our space for that purpose, we shall leave our readers to form their own opinion on this subject.

MEETING OF THE GENERAL COMMITTEE,

SATURDAY.

THE General Committee assembled in the Library of the Athenæum: the attendance was unusually numerous. On taking the chair, the Earl of Burlington announced that he had received a letter from the Earl of Durham, declining to accept the office of Vice-President; and the Bishop of Durham was unanimously elected in his stead.

No explanation of this circumstance was demanded or given in the Meeting; and as the facts were not generally known to the members, and became the subject of conversation and mistaken comment, it is but justice to all parties to state them briefly and fairly. So certain was the belief that Newcastle would be chosen for the next place of meeting, that the Council, early in the summer, wrote to the local authorities to make the necessary arrangements, in order that they might be laid before the General Committee at Liverpool. The Local Council, conceiving that the choice of a President was within the limits of their delegated power, tendered the office to the Earl of Durham, by a unanimous vote; and that nobleman expressed his willingness to serve. In the meantime, the General Council had made the same offer to the Duke of Northumberland, who had also consented to accept it. It is to be regretted that no public mention was made of these circumstances until the double choice had involved all parties in grave difficulty. Three-fourths of those who voted for the Duke of Northumberland on Thursday, were ignorant of these facts. Had they been known, it is exceedingly probable that a majority of the Committee would have solved the difficulty, by electing the Bishop of Durham, or the the Rev. Vernon Harcourt to the office.

The following grants were then proposed:—

Section A.—Mathematics and Physics.

For reduction of observations on the stars	£500
For discussions of tidal observations at Bristol ..	75
For hourly observations in meteorology	50
For repair of Whewell's anemometer, used at Plymouth	10
For extending the Catalogue of the Astronomical Society	500
For observations on waves	100
For determining the effect of gases on Sir D. Brewster's solar spectrum	100
For constructing a new anemometer, under the superintendence of Mr. Snow Harris	40
To the Meteorological Committee	100
For constructing a rock-salt lens	80
Total amount of grants to the Physical Section..	£1555

The Marquis of Northampton said, that, looking at the great amount of the grants, and the limited funds of the Association, he would take leave to recommend economy to the Committee, and, as far as possible, to restrict its annual expenditure within the limits of its annual receipts.

The Earl of Burlington, Sir William Hamilton, and Mr. John Taylor, severally explained, that, in point of fact, the outlay of these grants would be spread over several years; and that the annual expenditure would scarcely exceed one-third of the money voted.—Colonel Sykes supported the views of the Marquis of Northampton, and especially impressed on the Committee the expediency of keeping the compositions of life members as a reserve fund for future contingencies.

Section B.—Chemistry.

For experiments on atmospheric air	£20
For continuation of table of chemical constants ..	30
For observing the effects of fresh and salt water on wrought and cast iron	20
For observing the effect of heat of 212° on organic and inorganic bodies	10
Total amount of grants to Chemical Section ..	£80

Section C.—Geology.

For continuing the observations to determine the relative levels of land and sea—*balance of a previous grant*	£272
For aiding the publishing of Agassiz's Fossil Ichthyology	105
For observations on the peat mosses (bogs) of Ireland	50
For experiments on mud and silt in rivers	20
Total amount of grants to Geological Section ..	£447

In reference to the first of these grants, Captain Portlock stated, that the sum of 500*l.* had been given to a Committee, at the Dublin meeting, for determining the relative level of land and sea; but that Mr. Whewell, the Secretary to the Committee, without consulting the rest of the members, had undertaken the inquiry, aided only by Messrs. Greenough and Griffiths; and he intimated a doubt whether the best line of levels had been selected. He also said that the report had been presented in the name of the acting members of the Committee,—thus casting a seeming imputation on the others, as if they were indifferent to the advancement of science.

Mr. Whewell explained, that the grant had been made on his motion, and that he had designed to institute a special inquiry, not perhaps sufficiently expressed in the general terms of his proposition. When the Association met at Bristol, he found that nothing had been done during the preceding year, which he attributed to the Committee being too large, and the members too much dispersed, for active co-operation. He had therefore procured the aid of those whose services were immediately available, without intending to cast the slightest imputation on the other members; and he regretted if there was even the semblance of discourtesy in his conduct towards them.

Section D.—Natural History.

For observing the growth of plants confined under glass	£50
For experiments on the preservation of animal and vegetable substances	25
Total amount of grants in Natural History Section	£75

Section E.—Anatomy and Medicine.

For observations on the absorbent and venous systems	£50
For observations on the effect of poisons on the animal economy	25
For the chemical analysis of animal secretions ..	25
For observations on the motions and sounds of the heart	50
For observations on the pathology of the brain ..	25
For experiments on lung-disease in animals	25
Total amount of grants to Medical Section ..	£200

Section F.—Statistics.

For inquiries, purely statistical, into the state of education, especially in large towns	£150
For inquiries, purely statistical, into the condition of the working classes	100
Total amount of grants to Statistical Section ..	£250

Section G.—Mechanical Science.

For determining the strength of cast-iron, made by the hot and cold blast, and extending the inquiry to wrought-iron	£100
For printing Mr. Taylor's report on the duty of Cornish engines	50
For inquiry into the duty performed by one bushel of coals in pumping engines, not in Cornwall ..	100
For determining rail-way constants	50
For observation on the duty of one ton of coals in steam-vessels, estimated in horse power	100
If the inquiry be extended to America, an additional grant	50
Total amount of grants to Mechanical Section ..	£450
Total amount of grants for the advancement of science	£3057

The following Reports were solicited by the Committees of the Sections:—

In Section A.—A report on Vision from Professor Wheatstone: a report on the practicability of applying Sir William Hamilton's improvements in Dynamics to lunar observations.

In Section B.—A report on isomeric bodies, from Professor Liebig; a report on organic chemistry and analysis, from Professor Liebig; a report on inorganic chemistry, from Professor Johnstone.

In Section C.—A report on fossil reptiles, from Professor Owen; and a report of the effect of voltaic electricity in the production of crystals, by a person or persons to be hereafter named by the Council.

In Section D.—Reports from Mr. Hooke on North American zoology; Professor Wilson (the naturalist) on British entomology; from Sir W. Jardine on the Salmonidæ; from Mr. Gould on the Caprimulgidæ; and from Mr. Hope on fossil insects.

The following were the recommendations:—

In Section A.—That Professor Whewell, Mr. Lubbock, and Dr. Traill, should form a deputation to Her Majesty's government, to request that tidal observations might be regularly kept and registered at Liverpool; that an astronomical observatory should be established in or near that port; and that measures should be taken to correct and extend the tables of the moon. It was also recommended that meteorological observations should be made at the dock of Liverpool, and at the different lighthouse and telegraph stations along the coast. Thanks were voted to the trustees of the river Clyde, for the facilities they afforded to Messrs. Russell and Robinson when making tidal observations; and it was recommended that these observations should be continued.

In Section C.—That Civil Engineers should preserve drawings of cuttings which were to be filled up; marking the nature and dip of the strata, and preserving the fossil remains if any.

In Section D.—That a committee should be appointed to prepare a Fauna of Ireland; that Mr. J. E. Gray should commence a series of investigations into the mode by which Moluscæ and Anellidæ penetrate rocks; and that the researches respecting the Crustacea at Southampton should be continued.

In Section E.—That investigations should be undertaken into the physiology of the lungs and Bronchiæ.

In Section F.—That Professor Jones should continue his examination of the Statistical records preserved at the India House; and that the inquiries commenced by the Manchester Statistical Society into the state of education and the condition of the working classes, should be continued as nearly as possible on the present plan.

Sir David Brewster said, that the exhibition of models had been a failure this year, because no one had been appointed to look after this new department of the Association. Sir David Brewster, Professors Babbage, Wheatstone, Willis, and Powell, Messrs. Abraham, Griffiths, and Robinson, were then appointed a committee, to make arrangements for the exhibition of mechanical models at the meeting of the Association in Newcastle.

Professor Sedgwick complained of the effect of the resolution, limiting and defining the Philosophical and Literary Institutions whose office bearers and delegates were admissible to the General Committee; he also regretted that so important a change had been adopted without sufficient notice. After discussion, it was resolved that this matter should be brought before the General Committee as early as possible after its assembling in Newcastle.

Some regulations were then made for facilitating the admission of Members and the issuing of tickets, and it was decided that an editor should be employed to superintend the printing of lists, &c., the only department which had signally failed.

The Earl of Burlington stated, that he had received a letter from the chairman of a meeting of all the delegates from literary and philosophical Institutions assembled in Liverpool, requesting the general body of the Association to join in a petition to Parliament for the exemption of buildings used for literary and scientific purposes from taxation. His Lordship said, that at so late an hour, and when so many members had retired, he did not think that he should be justified in submitting a question of such importance to the Committee.

Mr. Hutton, M.P. said that he had spoken to the Chancellor of the Exchequer on this very subject, and that Mr. Spring Rice declared the readiness of Her Majesty's government to make the exemption, provided such a strict definition of a philosophical

Institution could be given, as to prevent the possibility of fraudulent claims. For his own part, he much doubted whether such a definition could be framed.—Several of the delegates acknowledged that this was a very grave difficulty, and promised to take the subject into consideration before further pressing their claims.—Thanks were then voted to the Earl of Burlington, and the Committee adjourned.

REVIEWS

The Cabinet Cyclopædia.

Domestic Economy. Vol. II. By Michael Donovan. Longman & Co.

Physicians and lawyers, it is said, are alone thoroughly acquainted with the infirmities of human nature; and the valet-de-chambre sees far too closely into the littlenesses of the great, to have any very profound respect for those before whom the world in general "unveils its bonnet." Professional critics, too, are unfortunately admitted behind the scenes,—all the consequences of which we will not here set down; but they, and they alone, perhaps, are fully aware of the small sum of thought which is expended in the process of book-making, and can justly estimate the passive condition of the intellects of readers in general, and of the authors who cater for them. We really begin to doubt whether man is naturally a thinking animal, and whether genius be not, as some have imagined, an exception, and a disease. Be this as it may, whether the prevailing inapprehensiveness be a necessary result of organization, or only a habit induced—the fact subsists to a degree far beyond what even ordinary philosophers conceive; and is only manifested, as we have said, to those whose daily task it is to gauge the products of the press, and to witness the perpetual cycle of commonplace and gratuitous assertion, in which the professed instructors of the public live, and move, and have their being. In the present state of the public mind, the art of printing threatens to become a positive evil. Nature makes man simply ignorant; but the education of books is rapidly tending to render him imbecile: so that if we have not soon a second Omar to consume our libraries, the probability is, that much learning will make the people, not mad, but stupid. How is it possible that minds nurtured upon perpetual mediocrities, trained and exercised in a go-cart literature, which, so far from encouraging the exercise of the faculties, and soliciting or suggesting reflection, aims not even at raising a smile, or beguiling us of a tear,—how is it possible that minds thus benumbed can escape from their thraldom, or entertain a suspicion that there exists a possible something more spirit-stirring or more fruitful? Accustomed as they are "to be spoken to by their recorder," they learn to resent as an outrage the appearance of a stranger writer, who presumes to shake their ignorant self-satisfaction.

The opening of the book market to the classes heretofore unused to read, (with all its immense advantages to humanity,) has this incidental mischief, that it encourages the multiplication of bad books, or rather of works which, without being decidedly bad, are yet capable only of a humdrum, muzzy excitation, that affords occupation, but rouses not the intellects from torpor. Much might have been done to render such a change in the habits of the people the occasion for enlarging and strengthening the public mind, for creating a vivifying moral doctrine, and awakening a moral feeling, at once the cause and the consequence of a real progress in civilization. This the Useful Knowledge Society might have done, but it mistook its vocation. It sought to cram the people with the materials for knowledge, instead of developing their powers of using it; it laboured to create a race of subaltern pedants, not to produce a body of enlightened citizens; and the consequence has been that while a small smattering is extensively diffused, and the working classes perhaps put in the way of more money-making power, the moral energies of all classes have retrograded, and society is less than it ever was on a level with its fortunes, and less capable of exercising its vast dominion over matter, to the purposes of general happiness.

In the absence of some such presiding body, the booksellers cannot be expected either to know what is wanting, or to step out of the jog-trot highways of commercial speculation, in order to create a new literature. They hear that there is a demand for "Useful Knowledge," and they endeavour to supply the market by works like this Cyclopædia; that is to say, by collections of matters of fact, or of opinion, the pourings out of many vials into one, effected with as much or as little ability as chance may enlist into the service; but designedly as remote as possible from the semblance of vital philosophy, in order that in its levelling universality it may take in as many subscribers as possible. We do not desire to fix our remarks on the particular volume before us, though it is a fair specimen of the class; but they may be especially illustrated by the Cyclopædia of which it forms a part. No work of so much pretension has issued from the press within our recollection. That the Editor knew well enough what was wanting, was manifest from the prospectus, which flamed like a portentous comet over the literary world; yet, to this complexion is it come at last, that not more than one volume in half a dozen is worthy of critical notice. We do not say this in censure—we here simply "record the fact." The philosophy of the subject, on which praise or censure should be based, is another guess sort of matter, deserving more deliberate attention; and, some day, when we are in the humour, we may take leave to discourse upon it, taking the Cabinet Cyclopædia as a text.

We now return to Mr. Donovan's 'Domestic Economy,' which is a rather laborious collection of odds and ends, of anecdote, and of facts, in which instruction is designed to be subordinate to amusement; the sweepings of libraries collected with little discrimination, arranged with little method, and, consequently, turned to very little scientific purpose. Here and there will be found scraps of information that may be new to the class of readers for whose use the book is more especially written; and here and there useful rules or inferences may be drawn from it; but towards forming public opinion on the subject under discussion, it does less than nothing, while incidentally it contributes its quota to the stock of common-places and prejudices.

Among the more original portions of the volume, the most interesting is the chapter on the loss sustained by animal food in the process of roasting and boiling. The results, if they may be depended on, will be valuable in charitable or other institutions, where large numbers of persons are to be provided for:—

"*Loss of Weight which Animal Food sustains in Roasting and Boiling.*

"The quantity of real solid matter in a given portion of flesh is smaller than would be inferred from inspection: water is by far the most abundant constituent. I am not aware that any estimate has been published of the ratio found in butchers' meat except one, and on this I do not rely: we however have the estimate of M. Chaussier, who made an experiment on a human body; and there is no reason to doubt that his result applies with tolerable accuracy to the lower animals. M. Chaussier dried a human body in an oven, the original weight of which was 120 pounds: when dry it was reduced to 12 pounds. Hence the solid matter of the body was to the water as 9 to 1, or one-tenth. Bodies which have been buried in the burning sands of Arabia, or the mummies taken from ancient catacombs, have always proved exceedingly light.

"It has been already shown, that in whatever manner meat is cooked there is a considerable diminution of substance, the loss consisting chiefly of water, juices, soluble matter, and fat.

"In an economical point of view, a comparison of the loss incurred in the two most usually employed processes, roasting and boiling, is interesting, yet has not occupied the attention of the public as much as the importance of the subject seems to demand.

"Professor Wallace, of Edinburgh, has given us the results of some experiments made to determine the loss which meat undergoes in cooking. It is to be regretted that it is not more in detail, and that the weight of the bone in each joint was not ascertained; but still it is of great value. The results, reduced to 100 pounds of meat, are as follow:—

	lb.
100 pounds of beef lost in boiling	26¼
100 pounds of beef lost in roasting	32
100 pounds of beef lost in baking	30
100 pounds of legs of mutton, averaging about 9¼ pounds each, lost in boiling	21¼
100 pounds of shoulders of mutton averaging 10 pounds each, lost in roasting	31⅓
100 pounds of loins of mutton, averaging 8 pounds 12 ounces each, lost in roasting	35½
100 pounds of necks of mutton, averaging 10 pounds each, lost in roasting	32¼

Thus the loss in boiling beef or mutton was less than in roasting. And it appears that meat loses by the cooking about one-fifth to one-third."

Subsequently, Mr. Donovan undertook the superintendence of some experiments of the same character; the results of which are shown in the following table:—

Names of the articles of food estimated.	Cost per lb raw.	Cost per lb cooked	Loss per cent. in cooking.
	d.	*d.*	
Salted flank of beef, boiled ..	6	7¼	13 1-5th
Salted tail-end of beef, boiled ..	6	8½	13 7-10ths
Salted brisket of beef, boiled ..	6	8½	18
Mackerel, boiled	6½	9¾	7½
Legs of mutton, boiled	8	10	10
Bacon, best part, boiled	8	10¼	6¼
Hand and leg of salt pork, boiled	8	10¾	13¾
Knuckle of veal, boiled	5½	10½	8½
Shoulders of mutton, roasted ..	7	11	28
Ribs of beef, roasted	8½	11¼	18
Turbot, boiled	9½	11½	5 5-9ths
Legs of mutton roasted	8	12	21 7-10ths
Turkeys boiled	10	13¾	16
Sirloin of beef, roasted	8½	13¾	20¾
Fore-quarter of lamb, roasted ..	8½	13½	22¾
Hams, boiled	10½	13½	12½
Legs of mutton, over-roasted ..	8	14	27 4-10ths
Turkeys, roasted	10	14¼	20¾
Hamburgh hung-beef, ribs ..	12	18	9 1-5th
Geese, roasted	12½	19	19½
Woodcocks, roasted, cheap season	—	24	
Chickens, roasted	18½	31	14 3-5ths
Chickens, boiled	18½	32	13¾
Ducks, roasted	13½	32	27¼
Haunch of venison, roasted ..	—	46	
Turkeys, large, crammed	—	50	
Woodcocks, scarce season	—	102	
Quails fattened	—	288	

There is also something new in the observations on coffee: we, however, must confine ourselves to results—and, first, of roasting coffee:—

"Instead of roasting the coffee in an atmosphere of its own steam, it will be better to dry it on a large iron pan over a very gentle fire, keeping it constantly stirring, so as to present new surfaces, until the colour become yellow. In this way, the chief part of the water will be dissipated without exerting any detrimental influence on the substance which is afterwards to form the aromatic bitter. After being thus dried, the coffee should be pounded into coarse fragments, by no means too fine; each kernel, as it occurs, being divided, perhaps, into four or five parts. In this state, it is to be transferred into roasting apparatus, and scorched to the proper degree."

The next question is, how best to extract all the good qualities of the coffee:—

"Infusion in boiling water extracts the aroma without the whole of the bitter; that long boiling extracts all the bitter and dissipates all the aroma; and hence we may infer that any effective degree of boiling must be in a slight degree injurious. The right mode of proceeding is therefore obvious. The

whole water to be used is to be divided into two equal parts, one of which is to be drawn on the coffee, but in an inverted order. In the usual order, boiling water is allowed to cool on coffee; but if this be inverted, cold water should be heated on coffee, over the fire, until it come to a boil, and then it is to be removed. This inversion cannot differ from the direct mode with regard to retaining the aroma: but it differs much with regard to the advantage of obtaining the liquid coffee at the end of the process boiling hot, instead of cool, and thus making a reheating necessary, which is always injurious. As soon as the liquor comes to a boil, it should be allowed to subside a few seconds, and then poured off as clear as it will run. Immediately, the remaining half of the water at a boiling heat is to be poured on the grounds; the vessel is to be placed on the fire, and kept boiling for about three minutes. This will extract all the bitterness left in the grounds; and after a few moments' subsidence, the clear part is to be poured off, and mixed with the former liquor. This mixed liquor now contains all the qualities which originally existed in the roasted coffee in perfection, and it is as hot as any taste could desire it. There is little doubt that the pungent aroma of coffee is perceived by the palate much more acutely when the liquor is very hot, and the fact is generally admitted."

In the details concerning the less usual articles of diet, and on cannibalism, we could have wished that the author had exercised a somewhat more discriminating taste. There are many passages calculated only to excite disgust.

In conclusion, we do not mean to say that 'Domestic Economy' is either a wholly uninteresting volume, or, as a collection of facts, less useful than many of its predecessors. It is of the description of work, and not of the individual specimen, that we complain; and if such books are to be multiplied *ad infinitum*, and the public gorged with indigestible and feckless reading, there may be found worse cooks to prepare the dishes than Mr. Donovan.

The Vicar of Wrexhill. By Mrs. Trollope. 3 vols. Bentley.

Mrs. Trollope is, assuredly, a clever woman; quick of eye, ready of hand, fearless in utterance—not devoid of a taste for what is beautiful, and refined, and luxurious,—though she seems, from choice, to delight in subjects which are painful and repulsive. She scents out moral deformities with a sort of professional eagerness, and applies herself to their exposure, regardless of the uncleanness into which her task may lead her, and the soil and foul odours she herself may contract in prosecuting the beloved work. In her last novel she plunged over head into the abominable sink of slavery; here, again, she is up to the neck in another kennel of corruption,—'The Vicar of Wrexhill' being a tale written for the express purpose of *showing up* the errors (as she esteems them) of a sect increasingly prevalent and powerful among us—the Evangelicals.

No one can suspect us of an undue disposition to favour Mrs. Trollope—or of the slightest wish to see subjects so dark and painful as she prefers to treat of, brought before the public by the means of Fiction. Her wand (Fiction's, not Mrs. Trollope's), had we the controlling will, should conjure up only "shadows of beauty, shadows of power," and leave whatsoever is coarse and squalid, debased and debasing, to sleep out its sodden sleep in the limbo of commonplace reality. But, as such a book as 'The Vicar of Wrexhill' has come before us for judgment, we are as much bound to declare our belief that it is true in its broad outline, as to protest against the class to which it belongs, and the taste with which it is executed. We make this declaration from personal experience; from the saddening knowledge that there exists in England and Ireland, at present, a Jesuitism, which has replaced the fire-and-faggot Papistry of the olden conclave and torture-chamber, with an intolerance as fierce, though more subtle,—an ambition as grasping, though more gentle in its means; and not only exists, but flourishes and spreads, with a counterbalancing and corresponding spread of licence and laxity of opinion on the part of those who dare not put on the mantle of infallibility, worn with so Pharisaical a pomp and outward display by the sect militant.

Mrs. Trollope begins her tale in a country manor-house, where the happiest of happy family parties keeps festival on the twenty-first birthday of the son and heir. The head of the house dies suddenly, the day after the revel, leaving behind him a splendid fortune, completely at the disposal of his widow, who is gentle, amiable, and confiding, but weak withal: the very tool for a Tartuffe. The latter presents himself in the moment of her bereavement—comforts her, prays with her, exhorts and interferes—sowing strife, and doubt, and self-distrust, where only love and peace had been; and finally succeeds in marrying the credulous woman, and inducing her to disinherit her son. The end is—well managed; how, we will not say. Seldom has Mrs. Trollope drawn a character, we grieve to say it, truer, in its distinguishing outline, to life, than the handsome, silky-spoken vicar of Wrexhill, with his black eyes and caressing hands, which make such sad havoc among the bevy of admiring village ladies. He glides on his way, like a serpent—glossy, silent, and poisonous—throwing out hints here, innuendoes there; blighting with the language of brotherly love, and, under the mask of a Scriptural sanctity, creeping steadily upwards towards wealth and power. His is a fearful character; and some of his later doings are too dark and terrible to have been written down by a woman,—aye, or a man either: but Mrs. Trollope loves debateable ground. We repeat that this character, in its broad outline, is true to the life; but, though we have no love for the sect which it professedly represents, we owe it to truth to acknowledge that it is overwrought,—that it is in some points not merely a libel on the sect, but a libel on humanity. But Mrs. Trollope cannot write without libelling—she cannot paint without caricaturing. By way of foils, we have Mrs. Mowbray's eldest daughter Helen, and her ward Rosalind; and poor, poetical little Fanny, whose devotion to the pastor, before he becomes her father-in-law, and the verses she writes to him, and the curls and other worldly gauds she sacrifices to his priestly authority, we could parallel by many an "ower true" tale. Miss Cartwright, the vicar's daughter, stands in awful contrast to him; she has fathomed his worldliness, and come forth from the search a hopeless unbeliever. Besides these, we have gay, manly Charles Mowbray, and the Harringtons, plain, peppery, and true-hearted. As a work of art, in short, 'The Vicar of Wrexhill' is little inferior to the best of Mrs. Trollope's works; but we cannot draw on it for a single extract, without the hazard of giving profitless, and, therefore, needless offence.

OUR LIBRARY TABLE.

London as It Is; being a Series of Observations on the Health, &c., of the People, by J. Hogg, M.D.—Here is another of those manufactured volumes against which we have protested in our notice of Mr. Donovan's work. It is scarcely conceivable that an educated man could have written a book with so little evidence of mind in it; there is hardly a fact or an inference that has not been produced and reproduced in one shape or another a dozen times at least, since we have sat in judgment on the issues of the press, and yet Mr. Hogg has gone deliberately to work—but how? to "observe," according to his title-page, or to think?—no, but to read, to collect together all that had been written heretofore, bearing directly or indirectly on his subject, and to give it a popular form,—that is, dilute it down "to the meanest capacities."

The Pocket Lacon; comprising nearly One Thousand Extracts from the best Authors, selected by John Taylor.—A thousand thoughts, each containing materials for thought. This is a rich little book, certainly; and its author, if not always judicious, has been wisely excursive in his selections, which range from Bacon and Shakespeare, and Petrarch and Montaigne, to Bulwer and Sir Charles Morgan.

Select Notes of the Preaching of the late Rev. Rowland Hill, A.M., by the Rev. E. Sidney, A.M.—These skeletons, rather than reports of sermons, will be welcome as companions to either the Episcopalian or Non-conformist Life of the zealous, but eccentric minister of Surrey Chapel.

List of New Books.—Gleanings, Historical and Literary, from Standard Authors, Letters, Tracts, &c., cr. 8vo. 10*s.* cl.—The Lyre, by A. and C. T. Gauntlett, fc. 4*s.* cl.—Covetousness brought to the Bar of Scripture, by James Glassford, cr. 8vo. 4*s.* cl.—A Pilgrimage by Sea and Land, or Divine Manifestations, translated from the German, by J. Jackson, fc. 6*s.* cl.—Venn's Memoir and Letters, 5th edit. 8vo. 12*s.* bds.—Thistlethwaite's Sermons on the Pentateuch, Vol. I., 12mo. 6*s.* bds.—Jamieson's Mechanics for Practical Men, 8vo. 12*s.* cl.—Wright's Life and Reign of William the Fourth, 2 vols. 8vo. 18*s.* cl.—Vincent on the Assembly's Shorter Catechism, new edit. 18mo. 2*s.* 6*d.* cl.—Anderson's Discourses on the Beatitudes, 2nd edit. 12mo. 4*s.* 6*d.* cl.—Thornton's Companion for the Sick Chamber, 2nd edit. 18mo. 2*s.* cl.—Three Experiments of Living, 18mo. 1*s.* cl., 1*s.* 6*d.* silk.—The Deserter, by Charlotte Elizabeth, 2nd edit. fc. 4*s.* cl.—Conversations on the Human Frame and Five Senses, sq. 3*s.* 6*d.* cl.—Words of Wisdom for my Child, 32mo. 2*s.* cl.—The Family at Heatherdale, by Mrs. M'Kay, 18mo. 3*s.* 6*d.* cl.—Parley's Wonders of the Earth, Sea, and Sky, sq. 5*s.* bds.—Lord Holt's Judgements on the Priviledges of Parliament, roy. 8vo. 5*s.* bds.—Hutton's Measurer, 11th edit. 12mo. 5*s.* bd.—Ainsworth's Dictionary, 8vo. new edit. 12*s.* bd.—Warren's Botanical Chart for Schools, 25*s.* on canvas and roller.—The Gods of Homer and Virgil, or Mythology for Children, sq. 3*s.* cl., 3*s.* 6*d.* hf-bd.—A Sketch of English History, by G. M. Gilbert, 12mo. 2*s.* cl.—Eagle on the Tithe Acts, 2nd edit. 12mo. 6*s.* bds.—Walford's Translation of the Psalms, with Notes, &c., 8vo. 15*s.* cl.—The Old Commodore, by the Author of 'Rattlin the Reefer,' 3 vols. post 8vo. 31*s.* 6*d.* bds.—The Despatches, &c. of the Marquess Wellesley, Vol. V., 8vo. 25*s.* bds.—Simpson's Plea for Religion, edited by his Son, 18mo. 3*s.* 6*d.* col., with Life by Sir J. B. Williams, fc. 7*s.* 6*d.* cl.—Smith's Bibliographical Account of Kentish Topography, 8vo. 14*s.* cl.—Israel's Wanderings, 3rd edit. 12mo. 6*s.* cl.—Paul's Epistle to the Romans, explained by G. B., 12mo. 3*s.* cl.—The Naturalist's Library, Vol. XIX. (Swainson's Birds of Africa, Vol. II.), fc. 6*s.* cl.—Wharncliffe's Letters and Works of Lady Mary Montagu, 2nd edit. 3 vols. 8vo. 42*s.* cl.—Corner's Life and Memoirs of Hannah More, 18mo. 2*s.* 6*d.* cl.—Corner's Sequel to Mangnall's Historical Questions, 12mo. 5*s.* bd.—Crabb's Synonymes, new edit. 8vo. 21*s.* bds.—Parsey's Arithmetic Illustrated, 12mo. 2*s.* 6*d.* swd.—Barker's Ainsworth's Latin-English Dictionary, 12mo. 3*s.* 6*d.* bd., complete, 6*s.* 6*d.* bd.—Tiarcks' German Grammar, 12mo. 6*s.* cl.—Cassella's Italian and French Conversations, 12mo. 3*s.* 6*d.* bd.—Hill's Poetical Monitor, new edit. fc. 3*s.* cl.—Snarley Yow, or the Dog Fiend, 2nd edit. 3 vols. post 8vo. 31*s.* 6*d.* bds.—Billing's First Principles of Medicine, 2nd edit. 8vo. 6*s.* cl.—Ram on Assets, Debts, and Incumbrances, 2nd edit. 8vo. 30*s.* bds.—Grant's Practice of Chancery, 4th edit. 12mo. 32*s.* bds.—Simms on the Principal Mathematical Drawing Instruments, 12mo. 2*s.* 6*d.* bds.—Wyld's Plan of the London and Birmingham Railway, 2*s.* 6*d.* in case.

ORIGINAL PAPERS

SIR EGERTON BRYDGES.

Our daily contemporaries have announced the death of this gentleman, as having taken place at Geneva, on the 8th inst. in his 75th year. It is impossible to record this without regret—whether for the loss of one who distinguished himself in literature, during the years of a long and troubled life, or whether we feel (as all must feel who know his writings), that he has gone down to the grave, with the saddened and unquiet spirit of one who feels that he has been followed by a persecuting fortune, which denied to him the just reward of his labour. By Sir Egerton Brydges' autobiography, we find, that he was born in the year 1792, of a family allied to many noble houses; the connexion led him at an after period of his life, unsuccessfully, to attempt the recovery of the title of Chandos of Sudeley. Some of his kindred, too, were literary as well as titled; Gibbon, the historian, being his cousin. It is needless for us once again to follow this self-written record, through its deeply interesting, but as deeply saddening pages, to dwell upon changes and chances

of fortune, through which Sir Egerton Brydges was but sustained by an unquenchable and consuming love of literature. It is enough to say, that at one time he occupied a seat in Parliament for Maidstone, (now represented by another literary man, Mr. D'Israeli, Junior); that he made Lee Priory (one of his Kentish residences,) classic ground to the lover of choice and curious literature, by establishing a private press there; and finally, leaving England, that he took up his residence on the Lake of Geneva, where he continued his literary pursuits to the last hour of his life with unabated zeal. The list of his works is a long one, including many volumes of poetry, several novels, the 'Censura Literaria,' the 'Restituta,' the 'British Bibliographer,' and other works of literary research and curiosity; besides political and critical essays, a volume on 'The Descent of English Peerages,' and recently his autobiography, and his edition of Milton, including a Life and critical notes: many exquisite poems, and happy thoughts too, were profusely distributed by him among the periodicals. All the writings of Sir Egerton Brydges were those of a scholar and a gentleman—of a genius, too, but a genius impetuous in its working, and without that dignified hopefulness and indifference to neglect and misconstruction, by which, and by which only, the poet and the philosopher can prove that he abides in (not soars occasionally to) a region of beauty and quiet *above* that tenanted by his "eating, drinking, buying, bargaining," fellow-men!

OUR WEEKLY GOSSIP.

Little has been passing in London, in the way of art, during the last fortnight; in the provinces, however, the Birmingham Musical Festival has been making a stir. The first performance took place on Tuesday, beginning with a national hymn, written by Barry Cornwall to a German air; then followed the Chevalier Neukomm's '*Ascension*,' an oratorio of older date than the two others by him, which are familiar to the English public, and which, though weighed down by the involution and impracticability of its words (from Klopstock's 'Messiah'), contains much fine choral writing, and may be altogether mentioned as one of the best works of its author. In the miscellaneous selection the chorus from Handel's 'Deborah' was, perhaps, the greatest and most imposing item of the scheme. We must not pass over the effect produced by Mrs. A. Shaw's lovely voice and grand style in a *preghiera* by Winter. At the Miscellaneous Concert in the evening, Mendelssohn's extemporaneous organ-playing was unquestionably *the* feature. He has spoken of the Birmingham organ as the noblest instrument he has touched, and he has not commended it without also proving himself a thorough master of its vast and varied powers. We rejoice in the sensation created by his playing—believing, as we have elsewhere said, that a revival of organ-playing would be attended with most salutary results in promoting the diffusion of a sound taste among our musical audiences and composers. So heavily do the men of science press upon us at this moment, that we have hardly a dozen lines in which to record the pleasure we received from the 'Saint Paul,' which we heard entire on the following morning. Our high opinion of it, recorded elsewhere, received "confirmation strong" on Wednesday: as a whole it went excellently. We must squeeze in a word of praise for the parties principally employed. Mrs. W. Knyvett, Miss Novello, Mrs. A. Shaw (who was *encored* in her song), and Messrs. Bennett, Hobbs, Phillips, and Machin. After it was over Madame Albertazzi sung 'From mighty Kings,' and Grisi the well-worn 'Gratias agimus,' and the performance wound up with Beethoven's 'Hallelujah,' not particularly well performed.

We were amused the other day, and taken back to the racy old days of Ben Jonson and Inigo Jones, by an announcement in one of our daily contemporaries, that it was in contemplation to get up a Masque for the Queen on her approaching visit to the city. What a rummage among property-books and precedents of pageantry will the poet elect have to go through, if this is really to be. There is also a talk of summer progresses next year, after the fashion of Queen Elizabeth. The days for these things, we fear, are a little gone by, and the days of railways come in their stead, but (not to trench upon Section G) we will leave this subject. Her Majesty, we perceive, has appointed Mr. Prout as her painter in water colours.

This year the British Association has lost one of its most active members by the death of Professor Ritchie, which took place at Musselburgh a few days ago. We must also notice with regret the early death of Dr. Rosen, of the London University, well known to the public as a distinguished philologist and oriental scholar, and to a large circle of private friends as a most amiable man.

We have now brought down our Report of the general proceedings of the British Association to its close, and we hope next week, with the aid of another double number, to complete those of the Sections. Fortunately, the season has been most opportunely dull, and nothing of novelty either in literature or art has been neglected.

FINE ARTS

Illustrations to the Landscape Annual for 1838. 'Spain and Morocco.'—The Landscape Annual is usually first (and best) in the field. In the portfolio before us the Spanish series is completed. Our eyes are certainly a year older, and perhaps our taste a year more exacting, than they were, but it seems to us, as a whole, that these plates have been made from slighter drawings than formerly—(some, indeed, are from sketches by other hands than Mr. Roberts)—and therefore, perhaps, the exquisite finish bestowed upon them by their engravers, produces an effect wiry where it should have been rich. The vignette, however, on the title-page, 'Tetuan,' with its honey-combed Moorish tower and its characteristic figures of men and camels, is a beautiful thing; and the Cathedral of Seville, which comes next (we presume as title-page), is most gorgeous, though corrupt in its mixture of styles of architecture—the plate is delicately engraved by Wallis. Next come two town views in Valencia, and a third, the Gate of the Serranos, whose twin towers, with their bold machicolations, remind us of more than one keep in our ancient English castles. The next plate shows the leaning (we might call it the *tumbling*) Tower of Saragossa; then comes a splendid specimen of the false florid in the 'Gate of the Hospicio, Madrid;' here, according to his wont, Mr. Challis has seconded Mr. Roberts with rare ability. Segovia, with its amphitheatre,—Salamanca, with its long bridge and rich crown of towers and spires,—and Placengia, beautifully lit up by a mellow sunlight, come next; after these the 'Seminario and Cathedral of Santiago.' The next nine subjects (all more or less striking from their novelty) are from Tangier, Morocco, and Tetuan, and the last shows us Constantina, a strong town perched upon a square and perpendicular rock, of such a grim and sturdy strength as to offer a sufficient puzzle to the skill, and a sufficient pique to the valour of our friends the French.

MUSIC

Sacred Harmonic Society.—*Mendelssohn's Saint Paul.*—The progress of the Sacred Harmonic Society is, of itself, a sufficient answer to the question, "Are we growing musical or not in England?" Two years ago it consisted of a handful of amateurs, with an organ out of tune, and a few bad instruments to serve for orchestra: but its members went the right way to work—studied good music, and that zealously; and now they are strong enough in resource and proficiency to throw open the large room in Exeter Hall, and, securing the additional assistance of the best instrumentalists and solo singers, to perform classical works before crowded audiences, at a price moderate beyond all precedent. Think of an Oratorio well got up for *three shillings!* And yet we hear, that the spirited amateurs put money in their purse at every one of their public exhibitions!

'St. Paul' was excellently performed on Tuesday week; the singers being Mrs. E. Seguin, Miss Birch, Mrs. A. Shaw, Messrs. Bennett, Hobbs, Phillips, A. Novello, and Chapman. Dr. Mendelssohn Bartholdy (so runs his formal style,) was in the gallery; *he* must, we think, have been as much gratified by the enthusiasm with which his noble work was received, as we were, by the spontaneous out-break at the end of the first act, when his presence was acknowledged with a storm of applause. For his Oratorio, it would be difficult for us to say too much in its praise—simple, massive—every note of it full of expression: written in the spirit of the great ancients, but not according to their letter. We should be disposed, unhesitatingly, to rank it next to the immortal works of Handel, being persuaded that every subsequent hearing must bring its truth increasingly home to every listener. It includes no difficulties crowded together for the production of great effects, (the resource of second-best genius); the airs are as easy, as they must be delightful to sing; and the orchestra, though, when it is required, as rich and figurative as a master's hand, guided by a master's mind, can make it—is kept in its proper place—that is, working together with the vocal parts, neither predominating over them, nor lagging behind. For these general characteristics, we could gladly add an extended analysis of a work, whose effectiveness, as well as its excellence, was proved by the numerous *encores* it commanded; but we are so cramped in space, by science, as not to have room to ride our hobby as far as we could wish: and perhaps our sober and unmusical readers will not regret this.

In the morning we had had the rare pleasure of hearing Mr. Mendelssohn, on the organ of Christ-Church, Newgate Street. Here, besides several extemporaneous pieces, he played Sebastian Bach's Prelude and Fugue, in A minor; and a Toccata, in D minor, by the same author, concluding with a magnificent Fugue (ex tempore) on a subject furnished him by Mr. S. Wesley. The masterly way in which M. Mendelssohn treated this theme, not only evinced his perfect command of the utmost resources of the art, but proved him to possess a mind of the highest order.

MISCELLANEA

Military Stratagems.—Few generals have been more distinguished for their military stratagems, than the Norwegian king, Harald Hardráda, who lost his life in the battle of Stamford Bridge, in 1066, when in alliance with the exiled Northumbrian Earl Tostig—an alliance which, by drawing off the forces of the last of our Anglo-Saxon monarchs to the north, greatly facilitated the Norman invasion. Harald Hardráda, in his youth, led a life of strange adventure in the East, and fought for some time under the banner of the Byzantine emperors. On one of his expeditions to Sicily, he got possession of a town by a singular stratagem, which is thus related by Snorri Sturluson, in his Heimskringla:—"When Harald arrived in Sicily, he began to ravage the country, and came with his army to a populous town, to which he laid siege. The walls, however, were so strong, that he began to doubt whether it would be possible to make a breach in them; and the burghers had plenty of provisions, and everything which they needed for their defence. Harald, therefore, ordered his fowlers to catch the small birds, that nested in the town, and flew to the forest during the day in quest of food. He then caused splinters of inflammable wood, smeared with wax and sulphur, to be fastened on their backs, and enkindled. The birds, when set at liberty, flew immediately to the town to revisit their young and their nests, on the roofs of the houses, which were thatched with reeds and straw. The fire fell from the birds on the thatch, and although each bore but a small quantity, their number was so great, that one house after another began to burn, until the whole town was in flames. The inhabitants then came out, and implored mercy, and Harald thus got possession of the town."

Preservation of the Vine.—The following mode of killing the worms which prey upon the vine is said to have been adopted in France with success. By placing a number of lamps in well greased dishes among the vines, 30,000 moths of the Pyrale species were destroyed in one night.

TO CORRESPONDENTS.

No. 461 is now reprinted, and the Monthly Parts for August and September, 1838, containing the Report of the Proceedings of the British Association at Bristol, may still be had.

ADVERTISEMENTS

KING'S COLLEGE, London.—SENIOR DEPARTMENT.—The CLASSES in THEOLOGY, the CLASSICS, MATHEMATICS, ENGLISH LITERATURE, and HISTORY, under the superintendence of the Principal and Professors the Rev. T. G. HALL, R. W. BROWNE, and T. DALE, will be RE-OPENED on TUESDAY, the 3rd October.
The Classes for Private Instruction in Hebrew, the Oriental and other Foreign Languages, will recommence on the same day.
JUNIOR DEPARTMENT.—The Classes in the School were re-opened on Tuesday, the 15th instant.
August 26. H. J. ROSE, B.D., Principal.
N.B. Chambers are provided for such Students in the Senior or Medical Department as are desirous of residing in the College.

UNIVERSITY COLLEGE, LONDON.—FACULTY OF ARTS.—SESSION 1837–8.
The Session will commence on MONDAY, October 16, when PROFESSOR DE MORGAN will deliver an INTRODUCTORY LECTURE, at Two o'clock precisely.

Classes:

LATIN—Professor Key, A.M.
GREEK—Professor Malden, A.M.
HEBREW—Professor Hurwitz.
SANSCRIT—Professor Rosen, Ph. D.
ORIENTAL LANGUAGES—Professor Falconer, A.M.
ENGLISH LANGUAGE and LITERATURE—Prof. Rogers.
FRENCH LANGUAGE and LITERATURE—Professor Merlet.
ITALIAN LANGUAGE and LITERATURE—Prof. Panizzi.
GERMAN LANGUAGE—Teacher, Mr. Wittich.
MATHEMATICS—Professor De Morgan.
PHILOSOPHY OF THE MIND and LOGIC—Professor the Rev. J. Hoppus, Ph. D.
NATURAL PHILOSOPHY & ASTRONOMY } Prof. the Rev. W.
CIVIL ENGINEERING } Ritchie, LL.D.
HISTORY—Professor the Rev. R. Vaughan, D.D.
ENGLISH LAW—Professor Lumley, B.C.L.
ZOOLOGY, RECENT and FOSSIL—Professor Grant, M.D.
GEOLOGY, GEOGRAPHY
STATISTICS, and POLITICAL ECONOMY } Professors not yet
CHINESE LANGUAGE } appointed.

DEGREES.—Students, on presenting Certificates from the College of having completed the course of Instruction required by the University of London, will be entitled to be admitted as Candidates for the Degrees of Bachelor and Master of Arts, and Bachelor and Doctor of Laws, to be conferred by the University.
SCHOLARSHIPS.—A FLAHERTY SCHOLARSHIP, of 50*l.* per annum, tenable for Four Years, will be awarded in the course of the Year 1838 to the best proficient in Mathematics and Natural Philosophy. Students entering in October will be admitted to competition for this Scholarship, in common with those of preceding years.
A FLAHERTY SCHOLARSHIP of the same amount and duration will be awarded, in alternate years, to the best proficient in Classical Languages.
Prospectuses and further particulars may be obtained at the Office of the College.
AUGUSTUS DE MORGAN, Dean of the Faculty.
CHARLES C. ATKINSON, Secretary.
31st August, 1837.

UNIVERSITY COLLEGE, LONDON.
FACULTY OF MEDICINE.—SESSION 1837—38.
The WINTER SESSION will commence on MONDAY, the 2nd OCTOBER. PROFESSOR COOPER will open the Session by a LECTURE introductory to his Course of SURGERY, at 2 o'clock precisely. The CLASSES in the order in which LECTURES are delivered during the day, are as follows:—
BOTANY—Professor Lindley, Ph. D.
MIDWIFERY and DISEASES of WOMEN and CHILDREN—Professor Davis, M.D.
ANATOMY, DEMONSTRATIVE and PRACTICAL—Professor Quain.
CHEMISTRY—Professor Graham.
ANATOMY and PHYSIOLOGY—Professor Sharpey, M.D.
MATERIA MEDICA and THERAPEUTICS—Professor A. T. Thomson, M.D.
COMPARATIVE ANATOMY—Professor Grant, M.D.
SURGERY, PRINCIPLES and PRACTICE of—Professor Cooper.
MEDICINE, PRINCIPLES and PRACTICE of—Professor Elliotson, M.D.
COURSES of LECTURES will be delivered during the Summer on Botany, Midwifery, and Obstetric Medicine, Pathological Anatomy, Medical Jurisprudence, Natural Philosophy, Practical Chemistry, Demonstrations of the Operations of Surgery and Fossil Zoology. Full particulars will be announced before the end of the Winter Session.

UNIVERSITY COLLEGE HOSPITAL (late North London Hospital).
PHYSICIANS: Dr. Elliotson, Dr. Thomson, Dr. Carswell, and Dr. Davis.
SURGEONS: Mr. Cooper, Mr. Liston, and Mr. Quain.
FEES TO STUDENTS OF THE COLLEGE: For Perpetual Admission to the Medical and Surgical Practice, £26 5*s.* For twelve Months' Attendance on Medical and Surgical Practice, £21.—Prospectuses and further particulars may be obtained at the Office of the College.
1st August, 1837. RICHARD QUAIN, Dean of the Faculty.
CHAS. C. ATKINSON, Sec.
FACULTY OF ARTS: Opening of the Session, MONDAY, 16th OCTOBER.

GUY'S HOSPITAL.—The AUTUMNAL COURSE of LECTURES will commence on MONDAY, 2nd of October.
THEORY and PRACTICE of MEDICINE—Dr. Bright and Dr. Addison.
MATERIA MEDICA and THERAPEUTICS—Dr. Addison.
ANATOMY and PHYSIOLOGY—Mr. Bransby Cooper and Mr. E. Cock.
ANATOMY, PHYSIOLOGY, and DISEASES of the TEETH—Mr. T. Bell.
DESCRIPTIVE ANATOMY—Mr. E. Cock and Mr. Hilton.
PRINCIPLES and PRACTICE of SURGERY—Mr. Key and Mr. Morgan.
MIDWIFERY and DISEASES of WOMEN and CHILDREN—Dr. Ashwell.
COMPARATIVE ANATOMY and PHYSIOLOGY—Mr. T. W. King.
CHEMISTRY—Mr. A. Aikin and Mr. A. Taylor.
Clinical Lectures and Instructions will be given on MEDICAL, SURGICAL, OPHTHALMIC, and OBSTETRIC CASES.
BOTANY—Mr. C. Johnson and Mr. G. Bird.
MEDICAL JURISPRUDENCE—Mr. A. Taylor.
EXPERIMENTAL PHILOSOPHY—Mr. G. Bird.
Pupils will be permitted to attend the Eye Infirmary and the Obstetric Charity, and will also have the use of the Museum, Library, Reading Room, and Botanic Garden, subject to regulations.
For Particulars apply to Mr. Stocker, Apothecary to the Hospital.

WESTMINSTER HOSPITAL SCHOOL of MEDICINE.—Mr. NORTH and Mr. GRIFFITH will commence their COURSE of LECTURES on MIDWIFERY and the DISEASES of WOMEN and CHILDREN, on TUESDAY, October 3. For particulars apply at the School; at Mr. North's, 18, King-street, Portman-square; or Mr. Griffith, 31, Lower Belgrave-street, Belgrave-square.

ST. GEORGE'S HOSPITAL.
The LECTURES on MATERIA MEDICA and THERAPEUTICS, commencing October 4, will be delivered by Mr. ANCELL, Surgeon to the Western General Dispensary, and Mr. HUTCHINS, late Apothecary at St. George's Hospital, in the Theatre of Anatomy and Medicine adjoining the Hospital.
For particulars apply to Mr. Ancell, 30, Albion-street, Hyde Park Terrace; Mr. Hutchins, 33, Chapel-street, Grosvenor-place; or at the Theatre adjoining the Hospital.

ST. GEORGE'S HOSPITAL.
SCHOOL of ANATOMY and MEDICINE, adjoining the Hospital.
LECTURES will be given during the ensuing Season, commencing OCTOBER 2nd, on
ANATOMY, PHYSIOLOGY, and SURGICAL ANATOMY—by Mr. Lane.
PRACTICAL ANATOMY with DEMONSTRATIONS—by Mr. Harrison and Mr. George Blenkins.
The PRINCIPLES and PRACTICE of MEDICINE—by Dr. Wilson and Dr. Wood.
The PRINCIPLES and PRACTICE of SURGERY—by Mr. Walker and Mr. Lane.
MIDWIFERY, and the DISEASES of WOMEN and CHILDREN—by Mr. Stone and Mr. G. T. Gream.
MATERIA MEDICA and THERAPEUTICS—by Mr. Ancell and Mr. Hutchins.
MEDICAL JURISPRUDENCE—by Mr. Hutchins.
BOTANY—by Mr. Hayes.
CHEMISTRY—by Mr. Brande and Mr. Faraday, at the Royal Institution, Albemarle-street.
CLINICAL MEDICINE and SURGERY—by Dr. Wilson and Mr. Walker, in the Theatre of the Hospital.

ALDERSGATE SCHOOL of MEDICINE.—The WINTER COURSES of LECTURES will commence on the 2nd of OCTOBER.
ANATOMY and PHYSIOLOGY—Mr. Skey, F.R.S.
DEMONSTRATIONS and SUPERINTENDENCE of DISSECTIONS—Mr. Skey, Mr. G. A. Rees, and Mr. White.
CHEMISTRY—Mr. Pereira, F.L.S.
THEORY and PRACTICE of PHYSIC—Dr. Hope, F.R.S.
MIDWIFERY—Mr. W. A. Walford.
FORENSIC MEDICINE—Dr. Southwood Smith.
MATERIA MEDICA and THERAPEUTICS—Mr. Pereira, F.L.S.
BOTANY—Mr. Quekett, F.L.S.
SURGERY—Mr. Skey, F.R.S.
COMPARATIVE ANATOMY—Dr. Grant, F.R.S.E.
Unlimited attendance on all the Lectures required by the Royal College of Surgeons and Society of Apothecaries, Forty Guineas.

TO PARENTS AND GUARDIANS.
A MEMBER of the Royal College of Surgeons, and Licentiate of the Apothecaries' Company, who is the Resident Medical Officer of a Public Institution at the West End of the Town, at which there are upwards of four thousand patients annually admitted, would be happy to receive a YOUTH of respectable connexions into his Establishment AS AN APPRENTICE (at an equivalent but moderate premium), who would have ample opportunities of acquiring a thorough knowledge of his profession during his apprenticeship, so as to be fully qualified for his examinations at the College and Hall at its expiration. He would have gratuitous admission to Lectures on Anatomy, Physiology, Pathology, Practical Anatomy and Demonstrations, Principles and Practice of Medicine, Materia Medica, Principles and Practice of Surgery, Midwifery, Medical Jurisprudence, Chemistry, Pharmacy, and Botany. Every respectable and satisfactory reference will be given and required.
For further particulars apply by letter (post paid), addressed to W. X. F., 25, Great Quebec-street, Montagu-square.

AN OUT-DOOR APPRENTICE wanted to the DESIGNING, ENGRAVING ON WOOD, and PRINTING IN COLOURS.—No person need apply but those who have a taste for Drawing. Address, Mr. Baxter, 3, Charterhouse-square.

UNIVERSITY COLLEGE, LONDON, JUNIOR SCHOOL.
Head Masters.
THOMAS H. KEY, A.M., Professor of Latin in the College.
HENRY MALDEN, A.M., Professor of Greek in the College.
The SCHOOL will OPEN on TUESDAY, the 26th SEPTEMBER. The Session is divided into three Terms; viz. from the 26th September to Christmas, from Christmas to Easter, and from Easter to the 4th August. The yearly payment for each pupil is £15, of which £5 are paid in advance each term. The hours of attendance are from a quarter past 9 to half-past 3, on the first five days of the week, and to a quarter past 12 on Saturdays.
The subjects taught (without extra charge) are Reading, Writing; the Properties of the most familiar Objects, Natural and Artificial; the English, Latin, Greek, French, and German Languages; Ancient and Modern History; Geography, both Physical and Political; Arithmetic and Book-keeping; the Elements of Mathematics and Natural Philosophy.
Any pupil may omit Greek and Latin, or Greek only, and devote his whole attention to the other branches of Education.
There is a general Examination of the pupils at the end of each Session, and the prizes are then given. The discipline of the School is maintained without corporal punishment. A Monthly Report of the conduct of each pupil is sent to his parent or guardian. The New Class Rooms, which the Council have assigned to the Junior School department, have been recently opened.
Further particulars may be obtained at the Office of the College.
August, 1837. CHAS. C. ATKINSON, Sec.

UNIVERSITY COLLEGE SCHOOL.
Mr. HASELWOOD, Private Tutor, and Assistant Master at the University College School, receives, under the sanction of the Head Masters, a select number of YOUNG GENTLEMEN as BOARDERS, to be educated in the School of the College. Terms for Board and Private Tuition, FORTY-FIVE GUINEAS PER ANNUM. Each pupil has a separate bed. The number being limited, a term's notice is required prior to removal.
The house adjoins the Play-ground of the College, to which (with permission of the Council) a communication has been opened for the pupils' recreation.
Letters (post paid) addressed to Mr. Haselwood, 20, Upper Gower-street, Bedford-square, will meet with attention.
20, Upper Gower-street, 31st August, 1837.

Sale by Auction.

SOUTHGATE'S ROOMS.
BOOKS IN QUIRES AND BOARDS.
MESSRS. SOUTHGATE & SON have received instruction to SELL BY PUBLIC AUCTION, at their Rooms, 22, Fleet-street,
The ENTIRE REMAINING STOCK, together with the STEEL PLATES and MAPS of the interesting and valuable Work entitled The HISTORY and TOPOGRAPHY of the UNITED STATES of AMERICA, from the Earliest Period to the Present Time, by J. H. Hinton, A.M., 2 vols. 4to., first published at 6*l.* 6*s.*—The remaining Copies of Bouchette's British Possessions in North America; a Topographical and Statistical Description of Upper and Lower Canada, with a Topographical Dictionary of Lower Canada, plates, 3 vols. 4to., first published at 4*l.* 4*s.*—Also, Copies of Cotman's Architecture of Normandy, 2 vols.—Cottingham's Henry the Seventh's Chapel—Chambers' Architecture, 2 vols.—Lodge's Portraits, 240 fine India proofs—Granger's Biography, 3 vols. folio—Caulfield's Portraits of Remarkable Persons, 4 vols.—Langhorne's Plutarch, 6 vols.—And various Standard Works.
Specimens may be seen, and Catalogues (price 1*s.*) had at the Rooms.
*** Money advanced upon Duplicate Portions of Booksellers' Stock, upon Libraries, and Literary Property in general.

FOR RINGWORM, ETC.
POWER'S ALOPECIAN OINTMENT continues to be sold for the Proprietor by Mr. THOMAS BUTLER, No. 4, Cheapside, corner of St. Paul's, London; by Butler & Innes, 20, Waterloo-place, Edinburgh; and by most Chemists and Druggists. In 2*s.* 9*d.* Pots, with printed Directions for its use.
It effectually cures Ringworm and Scald-head, without leaving a scar or injuring the skin. It is free from any deleterious article; all its component parts are at times taken internally, which should give it a decided preference over other preparations of the sort, many of which are highly dangerous.

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Matthew Forster, Esq., *Deputy-Chairman.*

Alex. Bannerman, Esq. M.P.	Thomas H. Kerfoot, Esq.
J. W. Childers, Esq. M.P.	John Norbury, Esq.
Sir James Eyre, M.D.	John Parker, Esq. M.P.
William Haigh, Esq.	Edward T. Whitaker, Esq.
J. Bulkeley Johnson, Esq.	

FIRE or LIFE Assurance on the lowest terms consistent with mutual security.—No charge for Fire Policies.—Prospectuses may be had at the Offices in London or York, or of any of the Agents.

EAGLE INSURANCE COMPANY.
NOTICE IS HEREBY GIVEN, that the TRANSFER BOOKS of this Company will be SHUT from the 1st day of October to the 1st day of November next, when a DIVIDEND of FIVE per CENT. will commence payment at the Office in the Crescent, between the hours of 11 and 3, and continue paying every following day between the same hours. HENRY P. SMITH, Actuary.
The Eagle Office, Crescent, Blackfriars, Sept. 7, 1837.

EAGLE INSURANCE COMPANY.
NOTICE IS HEREBY GIVEN, that pursuant to the Deed of Settlement, an ANNUAL GENERAL MEETING of the PROPRIETORS of ten or more shares will be held at the London Coffee-house, Ludgate-hill, on Friday, the 6th day of October next, at 12 o'clock at noon for 1 o'clock precisely, for the purpose of receiving the Accounts of the Company, and of Electing Four Directors in the room of Sir James Macgrigor, Bart. F.R.S., Deputy Chairman, John Kingston, Esq., John Richards, Esq., Peter Skipper, Esq., and one Auditor in the room of I. G. Lynde, Esq., who go out by rotation, but who are eligible to be re-elected.
HENRY P. SMITH, Actuary.
Crescent, Bridge-street, Sept. 7, 1837.

PROMOTER LIFE ASSURANCE and ANNUITY COMPANY, 9, Chatham-place, Blackfriars, London. Established in 1826.
The leading features of this Office are:—
As low rates of premium for ordinary risks as is consistent with safety and security.
Assurers may contract to pay their Premiums either in one sum, in a given number of payments, in annual, half-yearly, or quarterly payments, or in any other way most suitable to their circumstances and convenience.
Officers in the Army and Navy are charged the ordinary rates until called into active, colonial, or foreign service; when an increased rate is required in proportion to the specific risk incurred; or assurers may take out at once policies to cover all risks at an even additional rate.
Persons afflicted, or who are going beyond the limits of the Continent of Europe, are likewise assured at moderate premiums.
The rates for short assurances, more especially to enable *Equitable policy* holders to secure the 1840 bonus, are very low.
Prospectuses and all requisite information may be obtained at the Office. Proposals can be passed daily.
M. SAWARD, Secretary.

GLOBE INSURANCE,
PALL MALL and CORNHILL, LONDON.
FIRE, LIVES, and ANNUITIES.
At the SOUTH SEA HOUSE, in Threadneedle-street, during the Rebuilding of their Premises at the Corner of CORNHILL and KING WILLIAM-STREET.
Capital ONE MILLION STERLING, the whole paid up and invested; thereby affording to the Proprietors security against further calls, and to the Assured an immediate available Fund for the payment of the most extensive Losses; and therefore no person insured by THIS COMPANY is liable to be called upon to contribute towards the losses of others, as with Societies established on the principle of mutual Insurance.
Reduced Rates for Insurances on Lives for short terms of years.
Annuities granted and purchased; and Annuitants may receive their payments through the Company's Agents in the Country, WITHOUT EXPENSE.
Reversions of Stock, or Money, or other Life Contingencies purchased, in Sums from Two to Ten Thousand Pounds.
Endowments for Children granted, either by Single or Annual Payments, according to the Age of the Child.

FIRE INSURANCE.

Common Risk.	Hazardous.	Doubly Hazardous.
1*s.* 6*d.* per Cent.	2*s.* 6*d.* per Cent.	4*s.* 6*d.* per Cent.

Government Duty, 3*s.* per Cent. per Annum.
Farming Stock Insured generally on the Farm.
Losses from Fire by Lightning are made good.
Mills, Manufactories, and other Special Risks, are Insured at Rates corresponding with their several Hazards.

EASY MODE of SECURING the BONUS on EQUITABLE POLICIES by the UNITED KINGDOM LIFE ASSURANCE COMPANY, 8, Waterloo-place, Pall Mall, London; established by Act of Parliament, for Assurances of Lives and Survivorships, and likewise for the Granting and Purchasing of Annuities.

Honorary Presidents.

Earl of Errol.
Earl of Courtown.
Earl Leven and Melville.
Lord Viscount Falkland.
Lord Viscount Eastnor, M.P.
Lord Viscount Glandine.
Lord Elphinstone.
Lord Belhaven and Stenton.
Sir J. H. Dalrymple, Bart.

James Stuart, Esq. *Chairman.*
William Plasket, Esq., *Deputy-Chairman.*

The accommodation now offered to the public by the following condition will be found particularly convenient, and well worthy the serious consideration of parties who may wish to secure to their families the bonus expected on Equitable Policies, January 1, 1840, and, by adopting it, not only will that object be attained, but they may avail themselves of continuing the insurance for the remainder of life, at the premium of their present age, whatever may be their state of health, after having received the bonus of the Equitable:—

"When an insurance is for life, half the Premium may remain unpaid for five years at interest, to be deducted eventually from the Policy, or paid off at convenience, it being perfectly understood that, if the party discontinues the insurance, the Company have no claim on him for the portion of the Premium that is unpaid."

Thus, a gentleman of 45 may be insured for the whole period of life at 3*l.* 10*s.* 6*d.* per cent., and by paying 1*l.* 15*s.* 3*d.* for the first five years, he may discontinue his insurance as soon as he has received the bonus of the Equitable, or may remain insured for life as above explained.

This Company grants liberal Annuities upon ages of 65 and upwards to parties themselves, but not assignable; and every information will be afforded on personal application at the Office, or by letters addressed to the Resident Director, Edward Boyd, Esq., 8, Waterloo-place, Pall Mall.

LIFE INSURANCES.—The recent extraordinary uprise of projects of this kind, must naturally induce all considerate persons to inquire into, and reflect on the security and benefits to be expected from them; particularly as before the successive reductions of premiums, which have lately taken place, and while money improved at a high rate of interest, upwards of Thirty Life Insurance Offices broke up, some of them in total insolvency, and the expedients to which other of the minor Offices have resorted to avoid payment of heavy claims, render them no less disastrous to persons who have inconsiderately put their trust in them. Still Life Insurance continues a favourite subject with the projectors of Joint Stock Companies, because for the first few years deaths seldom happen, and all received appears on the side of profit. On this account also the New Fire Offices undertake Life Insurance to improve the aspect of their accounts, although for many reasons Life Insurance and Fire Insurance ought to be kept entirely separate concerns. Considering these things, and additionally that when a man insures his life he enters into a contract for life, and, if he see reason, cannot withdraw from it, and open a new Insurance in another Office, but under the material disadvantage of paying for an advanced age, he will pause before he resorts to untried adventures while Offices of approved stability and conduct are open to insure him.

THE PROVIDENT LIFE OFFICE will be found, upon examination, to have long *realized* every benefit and convenience to the public which is *promised* in the new projects. For the main purpose, provision for surviving objects of affection, the advantages of the Provident Office are second to none. *All the profits*, except about 5 per cent. thereon allotted to the Original Members for their guarantee Capital of a quarter of a Million sterling, and their exoneration of the insured from all responsibility, are septennially divided among *all* insured for Life, in proportion to their contributions, and *added to their policies*; or in their option applied to the *reduction of their future premiums*. These additions have amounted to 40 per cent. on the premiums received, and in the whole to £313,662. Their effect may be judged of from a policy taken out by his late Majesty on his own life for £3000, which additions increased to £3963.

But if a man fall into the necessity of requiring that relief for himself, which he intended for a surviving family, or his object cease, or his means of continuing his payments fail, after he has made seven payments, the Provident will give him the value of his Policy, which, if he see fit, he may apply to the purchase of an annuity for the remainder of his life; or he may obtain a loan from the Office on the security of such Policy. Another benefit of very great practical importance is peculiar to the Provident Office. From various causes the exact time for paying renewals is frequently passed over, and some of the Offices avail themselves of the lapse of only a few days to refuse to renew, and to seize on all they have been receiving for years as a clear gain. In the Provident, *a whole year* is allowed for the revival of a Policy, neglected to be renewed when due.

As some recent Offices have adopted the name Provident, it may be necessary to observe that the *Provident Life Office*, founded in 1806 conjointly with the *Original Provident Institution*, or *Bank for Savings*, is in Regent-street, Piccadilly.

J. A. BEAUMONT, Secretary.

TO ARTISTS, TOURISTS, AND ADMIRERS OF THE FINE ARTS.

PARLOUR'S PORTABLE SKETCHING-CASE, or Delineator, is confidently recommended to the notice of all persons attached to the Science of Drawing, as being infinitely superior to the Camera Lucida, and all other instruments hitherto invented for the purpose of sketching. The Sketching-case may be held in the hand, and a correct drawing made of any object or landscape, or it may be attached to a table in the same manner as the Camera Lucida. It is simple in its management, and does not exceed in size the common sketching book.

Manufactured for the Patentee by Reeves & Sons, 150, Cheapside; may be had also of Smith & Warner, Marylebone-street, Piccadilly; Jones & Son, Opticians, Charing-cross; and at all other Opticians and Artists' Repositories. Ladies and Gentlemen who have the Camera Lucida, may have the Delineator affixed to their own stem.

STATISTICAL JOURNAL and Record of Useful Knowledge.—On the 2nd of October will be published, price 2*s.*, the First Number of the above Work, to be continued Monthly.

Lately published, in 3 vols. 8vo. 36*s.* bds.

PROOFS and ILLUSTRATIONS of the ATTRIBUTES of GOD, from the Facts and Laws of the Physical Universe; being the Foundation of Natural and Revealed Religion.

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"Its information is worthy the present advanced state of science, and its calm and moderate tone is in perfect accordance with the important subjects discussed."—*Athenæum.*

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EVOLUTION, or the POWER and OPERATION of NUMBERS, in the Statement, the Calculation, the Distribution, and the Arrangement of Quantities, Linear, Superficial, and Solid. By THOMAS SMITH.

Not harsh and crabbed, as dull fools suppose;
But musical, as is Apollo's lute.—*Milton.*

"The work is inferior to no treatise yet published, in the importance of its subject; while, in the absence of all technical obscurities, and in its open and manly method of demonstration, we know of none which can be compared with it." *New Monthly Magazine.*—"It is one of the most interesting and pleasing treatises that can be put into the hands of youth. Clear as glass, flowing as water, true as the needle, and attractive as the magnet. Mr. Smith's style carries the delighted reader forward throughout the intricacy of his evolution." *Atlas.*—"It is a very clever work on numbers, suitable to the pupil, and not less a study companion." *Naval and Military Gazette.*

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